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In Two Sections
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Depreciation

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The Learning Curve

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Product Appraisal

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A Survey of Current Depreciation Practices

by ROBERT L. CARR

In April, 1960, a questionnaire study was made from a selection of 200 corporations in diversified fields of manufacturing. The purpose of this study was to learn the current impact of the 1954 Internal Revenue Code and the Small Business Act of 1958 on the depreciation accounts of this particular group of corporate taxpayers. The survey conducted by the author as part of graduate work at the University of Akron was made of 11 general manufacturing areas and included companies listed primarily from Standard & Poor's "Industrial Surveys." Completed questionnaires and comments were received from 152 companies.

Background

Prior to the passage of the 1954 Internal Revenue Code, representatives of various American industries had appeared before Congressional committees and requested that depreciation deductions for computing taxable income be allowed in the same amounts which business deemed appropriate for financial purposes. They especially expressed the desire to have a greater proportion of the depreciation on an asset allowable as a deduction during the earlier years of its life.

We know that Congress granted the request, inserting Section 167 into the 1954 Code, which specifically authorized certain methods for computing depreciation, in addition to the straight-line method. The two principal methods for increasing the depreciation in the early years of an asset's life are the 200-percent (or double) declining balance method and the sum-of-the-years digits method. To a large extent, these methods were not generally used in this country prior to 1954. However, accelerated depreciation has long been accepted in many European countries and our neighbor Canada adopted it in 1949.

These "fast" depreciation methods are allowable for tax purposes only for tangible new property acquired subsequent to December 31, 1953, having a useful life of three years or more and the original use of which as new property begins with the taxpayer. In addition to these methods, the code provides for the use of any other consistent method that does not result in greater depreciation

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allowances during the first two-thirds of asset life than would be available under the 200-percent declining balance method. For property acquired after December 31, 1953, which is not new and which does not meet the requirements for the above methods, the regulations have approved the use of the 150-percent declining balance method.

Under The Small Business Tax Act of 1958, there is a provision which allows taxpayers to take additional depreciation in the year assets are acquired. According to Code Section 79 of the Act, which is applicable to taxable years ending after June 30, 1958, new or used tangible personal property acquired after December 31, 1957, having a remaining useful life of not less than six years and a cost of not more than $10,000, may be depreciated at 20 percent during the first year, in addition to the regular provision for the first year. Although designed as an aid to small business, the allowance is available to any taxpayer, regardless of size.

Certainly the 1954 Internal Revenue Code and, to a lesser extent, The Small Business Tax Act of 1958 have influenced greatly the accounting for depreciation and taxes of the corporate taxpayer. The present study is to: (1) report the direction that corporate accounts of manufacturing industries have taken in order to avail the taxpayer of the possible advantages under the new laws and (2) assess and interpret the responses to the questionnaire as tabulated. The effect of certificates of necessity on corporate accounts for depreciation and taxes was not made a part of the study.

General Response

The general response of the corporate taxpayer engaged in manufacturing to the liberalized depreciation provisions of the 1954 Code has been to adopt such methods for tax reporting purposes. Only about 10 percent of the companies queried have declined to use the accelerated methods, at least partly, for tax purposes. This conclusion is drawn from answers to the following question, the results of which are tabulated in Exhibit 1:

> Have you since 1954 used any of the liberalized methods in computing depreciation for Federal income tax purposes?

Although the questionnaire did not ask for reasons for the answers made, a space for comments was provided, and these comments often indicated the reasons behind the non-adoption of the accelerated methods by some companies.

Various reasons are given for not utilizing this "fast" depreciation in Federal income tax computations. One company believes that, "there is only so much depreciation to be taken, and advancing it as a deduction only changes it between

Use of Liberalized Depreciation Methods for Purpose of Computing Federal Income Taxes

Industry	Total industry response	Answers Yes	Answers No	Percent Yes	Percent No
Automotive, aircraft and related industries	21	20	1	95	5
Building materials	10	9	1	90	10
Chemical and drugs	8	8	-0-	100	-0-
Electrical and electronic	8	8	-0-	100	-0-
Food, meats, baking and milling	21	19	2	90	10
Liquor and other beverages	11	9	2	82	18
Machinery and equipment	22	17	5	77	23
Paper	10	9	1	90	10
Petroleum and coal	10	8	2	80	20
Primary metals	20	19	1	95	5
Textiles	11	11	-0-	100	-0-
Total	152	137	15	90	10

EXHIBIT 1

years, while increasing the clerical costs of handling it." Another reason given is the desirability of keeping the same methods in use for both tax and accounting purposes and reluctance to adopt the "fast" depreciation for accounting purposes. One company defends its decision on the basis of two company policies:

> "The policy of our company has been to follow the same methods of depreciation for both book and tax purposes. Generally speaking, we feel that this is the preferable and most realistic approach for a large corporation under normal circumstances. It also has a significant advantage from the standpoint of simplification of record keeping and related procedures. Another basic accounting policy is to preserve the absolute integrity of the income statement."

But these are minority opinions and, judging from comments of some other companies not presently using accelerated depreciation for tax purposes, a switch is being studied and the ranks of the minority will be further decimated in the future. And this appears to be the pattern that adoption of accelerated depreciation for tax purposes has followed since the 1954 Code was passed. According to Dale Harwood, Jr., as of June, 1955, approximately 50 percent of all business

taxpayers had switched to an accelerated method.[1] Another study, by the National Association of Accountants, based on interviews of 55 selected companies and published April 1, 1958, revealed that 40 companies, or approximately 73 percent, had elected to use rapid depreciation methods at that time. The companies used as a basis for the report were selected from ones known to have given serious thought to the problem and to have developed reasons for their actions.[2] Finally, in a report dated April 20, 1960, Controllers Institute Research Foundation, Inc., summarized the results of 1,000 companies out of its membership which responded to a questionnaire on depreciation. This report indicated that 75 percent of the responding companies were using the liberalized depreciation methods. These figures point up the increasing popularity of the accelerated depreciation methods for Federal income tax purposes. Although the reports referred to above are hardly comparable with each other or even with the information in this article, with regard to the mix of companies sampled, it is not believed that the variation in the samples would be such as to modify the conclusion that "fast" depreciation is being used more widely today than ever before.

Financial Advantages of Accelerated Depreciation

Regardless of which depreciation method is used, providing an asset is retained by a company for its entire life, eventually 100 percent of cost less salvage value is depreciated. If the tax rate for ordinary income of a corporation remains constant and loss years are not considered, the company eventually pays the same total tax on its income whether accelerated or straight-line depreciation is used. Part of the financial value of accelerated depreciation arises from the fact that a portion of taxes ordinarily due is paid later than otherwise and this difference in time has a cash value. However, the tax savings, while having a real value from the standpoint of their present worth, will still have to be paid eventually. On the other hand, it should be noted that, in actual practice, the physical assets of a company are constantly deteriorating and, with normal growth and technological changes, regular replacements of assets are made. Assuming that these regular asset replacements take place, a permanent tax savings may result because part of the deferred Federal income tax may never have to be paid.

Exhibit 2 shows the reduction in 1959 Federal income taxes arising from the

[1] Dale Severy Harwood, Jr., "Effects of Accelerated Depreciation on Business Decisions," abstract of doctoral dissertation, appearing in *The Accounting Review*, October, 1959, p. 616.

[2] *"Current Practice in Accounting for Depreciation,"* Research Series No. 33, National Association of Accountants, April 1, 1958, p. 6.

Tax Reduction in 1959 Arising From the Use of Accelerated Depreciation Methods
(in thousands of dollars)

Company	Estimated Tax Without Accelerated Depreciation	Reduction Due to Use of Accelerated Depreciation	Percent Savings
Acme Steel Company	$43,308	$ 571	17.3
a c f Industries, Incorporated	991	210	21.2
Beatrice Foods Co.	9,066	450	5.0
Burroughs Corporation	11,072	1,382	12.5
Ceco Steel Products Corporation	2,537	36	1.4
The Celotex Corporation	3,970	668	16.8
Chemstrand Corporation	30,030	3,601	12.0
International Harvester Company	63,840	2,511	3.9
Jewel Tea Company	9,100	656	7.2
Sinclair Oil Corporation	10,175	950	9.3

EXHIBIT 2

use of accelerated depreciation by 10 companies from representative industries. None of the companies used in this table were queried in connection with the present questionnaire study but it is believed that the percent savings are reasonable and comparable to those of the companies to whom the questionnaire was sent. The figures are taken from annual reports, either as shown directly or as calculated from data provided in notes to their financial statements.

Another aspect of the financial value of using the accelerated methods for tax purposes is the capital gain possibilities. While an asset may not be purchased with the thought of selling it before it is retired, the contingent aspects of such a transaction should not be ignored. Most taxpayers generally recognize the tax saving potential if depreciation deductions can be increased. Following the subsequent sale of the depreciable property, the taxable capital gain will be increased by the amount of the increased depreciation. The additional depreciation results in a deduction at the applicable ordinary income tax rate, whereas the increased gain is taxed at the special reduced tax rates. The effect may be to convert ordinary income which is taxable to most manufacturing companies at a rate of 52 percent into capital gains which has a maximum rate of 25 percent. Subject to certain practical limitations, which will be described later, Exhibit 3 is devised for illustration. Assume that an asset, costing $1,100, having a salvage value of $100, and being depreciated over a 10-year life, is sold at the end of the sixth

Tax Reduction Arising from Unanticipated Sale

Asset cost	$1,100.00	$1,100.00	$1,100.00
Depreciation:			
Year	S-L	200% D/B*	S-O-Y-D
1	$100.00	$220.00	$181.80
2	100.00	176.00	163.68
3	100.00	140.80	145.44
4	100.00	112.64	127.32
5	100.00	90.11	109.08
6	100.00	72.09	90.96
Total	$600.00	$811.64	$818.28
Book value	$500.00	$288.36	$281.72
Sales price	500.00	500.00	500.00
Capital gain	$ -0-	$211.64	$218.28
Additional depreciation which has already been treated as a deduction for income tax purposes at 52%	$ -0-	$211.64	$218.28
Reduced tax at 52%	$ -0-	$110.05	$113.51
Tax on capital gains above at 25%	-0-	52.91	54.57
Tax Savings	$ -0-	$ 57.14	$ 58.94

*Not required to establish salvage value initially.

EXHIBIT 3

year for $500. (In actual practice the sales price would probably not be the same as the book value of the asset after being depreciated on the straight-line method. Nevertheless, they are treated as being the same in order to better point up the difference between the accelerated methods and the straight-line method.)

As mentioned before, the additional depreciation allowed results in an addition to capital gains of the same amount and a tax savings of 27 percent of this additional amount. The Treasury Department recognizes this potential loss of revenue to the U.S. Government and many times has attempted to convince Congress to add restrictions to the recognition of such capital gains. Even though the department's efforts have been unsuccessful in getting the code provisions changed, its efforts in other directions have been more successful.

As an example, revenue agents have been instructed to review depreciation computations in all field audits, and inquire into the use of salvage value for assets. Prior to the adoption of the rapid methods of depreciation in the 1954 Code, many court cases were decided without any determination of salvage value, but sometimes the court mentioned that salvage value was a factor to be considered

in computing depreciation. Although salvage value is determined by the taxpayer upon acquisition of the depreciable assets, the regulations require that it be changed in the event a change is made in the useful life of the asset or a change is made in the method of depreciation. For instance, a change from the 200-percent declining balance method to straight-line, as is permitted, would require the establishment of salvage value at the time the change is made. This could result in a smaller depreciation deduction than that allowed under the method used before. Another facet of the Treasury's "war" against capital gains has been the use of sales price in determining final salvage value. The end result of this practice has been for revenue agents to disallow depreciation in the final year an asset is held, if disposed of at a figure which results in a capital gain.

The door is not completely closed, however, to capital gains from this source. If a taxpayer determines and records some salvage value upon the acquisition of depreciable property, there is much less room for argument by the Treasury Department than if no salvage value at all is established. It is also important to be wary of making changes in lives or methods, as this requires a re-determination of salvage value, which may wipe out any advantage of the change.

Types of Accelerated Methods Used

It appears that the majority of companies make a decision between the sum-of-the-years digits method and the 200-percent declining balance method and do not supplement their elected method with any other type of permissible method. This conclusion arises from a tabulation of the answers to the following question, the results of which are shown in Exhibit 4:

> If you used any of the liberalized depreciation methods in computing depreciation for Federal income tax purposes, please check the methods used:
>
> Sum-of-the-years digits, 150% declining balance,
> 200% declining balance, Other.

Those companies using only the sum-of-the-years digits method comprise 40 percent of the companies polled and companies using only the 200-percent declining balance method make up an additional 34 percent. Altogether, nearly three-fourths of the companies use just one of these two methods. Going further, only about 12 percent of the companies using rapid depreciation have applied the 150-percent declining balance method to any used assets that qualify for this method.

Now, what are the reasons for preferring one method over another and for not mixing methods generally? The sum-of-the-years digits method might be

preferred because it yields a little greater depreciation in the early life of an asset. For example, take the case of a 10-year life asset having attained an age of 5 years. Where the total depreciation under the straight-line method would be 50 percent, the sum-of-the-years digits method would yield 73 percent as against 67 percent for the 200-percent declining balance method. Even where estimated salvage should be a factor, the advantage of the declining balance method in disregarding salvage value may be largely dissipated by the rule barring depreciation of an asset below a reasonable salvage value. Some people believe that the declining balance method is simpler in application and that this is a point to be considered in certain circumstances. Under a manually operated property record system, this might be true, but machine accounting methods have probably tended to negate this argument.

Type of Liberalized Depreciation Methods Used

Industry	S-O-Y-D Only	200% D/B Only	S-O-Y-D& 200% D/B	S-O-Y-D& 150% D/B	200% D/B& 150% D/B	S-O-Y-D& 200% D/B& 150% D/B	Total
Automotive, aircraft and related industries	9	5	2	2		2	20
Building materials	4	3	1		1		9
Chemicals and drugs	5	2		1			8
Electrical and electronic	2	1	1	2	2		8
Food, meats, baking and milling	6	8	5				19
Liquor and other beverages	6	1	1	1			9
Machinery and equipment	6	5	3		1	2	17
Paper	3	5	1				9
Petroleum and coal	1	5	2				8
Primary metals	9	7	2		1		19
Textiles	4	5	1			1	11
Total	55	47	19	6	5	5	137
Percent of total	40	34	14	04	04	04	100

EXHIBIT 4

Why have so few companies elected to use 150-percent declining balance depreciation for their used equipment? It may be that they are aware that only a limited advantage can be gained from using this method. The following illustration is presented. Assume that a company acquires a used machine at a cost

of $1,000 which has a useful life remaining of 10 years and no salvage value. If the straight-line method is used, the company will be entitled to a depreciation deduction of $100 per year for each year during the 10-year period. If the company elects to use the 150-percent declining balance method, it will be entitled to depreciation deductions as follows:[3]

Year	*Depreciation deduction*	*Undepreciated cost*
1	$150.00	$850.00
2	127.50	722.50
3	108.38	614.12
4	92.12	522.00
5	78.30	443.70
6	66.56	377.14
7	56.57	320.57
8	48.09	272.48
9	40.87	231.61
10	34.74	196.87

Only during the first 3 years would the depreciation deductions under the 150-percent declining balance method be greater than those under the straight-line method. The remaining 7 years would have deductions less than under the straight-line method. Furthermore, at the end of the 10-year life of the machine, the taxpayer would have received depreciation deductions amounting to only a little more than 80 percent of the machine's cost. Also, it should be noted that, unlike the 200-percent declining balance method, the taxpayer is not permitted to change from the 150-percent declining balance method to the straight-line method whenever he so desires. In order to change this method, he must first obtain the consent of the Commissioner (Rev. Rul. 57-510). Thus, a taxpayer pays a heavy penalty in order to obtain a small advantage during the first three years of life under this method.

This may partly explain the reason for lack of use of the 150-percent declining balance in conjunction with the other methods, by the companies queried. Another reason may be a desire among companies to restrict their computations of "fast" depreciation to a single type as an aid to record keeping and to simplify office procedures.

Rigidity in Application of Accelerated Methods for Qualifying Assets

This study did not attempt to test the depth to which accelerated methods of depreciation are being used by the corporate taxpayer in the field of manu-

[3] Federal Taxation Commentary, *The New York Certified Public Accountant*, August, 1959, p. 607.

facturing. A question was inserted, however, to probe into the number of companies which appeared to have a fixed policy with respect to "fast" depreciation:

> For assets meeting the requirements for the accelerated methods, do you use them entirely?

The answers to this question are tabulated in Exhibit 5.

Liberalized Depreciation Methods Used Entirely for Qualifying Assets

Industry	Total	Answers		Percent	
		Yes	No	Yes	No
Automotive, aircraft and related industries	20	17	3	85	15
Building materials	9	6	3	67	33
Chemicals and drugs	8	6	2	75	25
Electrical and electronic	8	7	1	88	12
Food, meats, baking and milling	19	16	3	84	16
Liquor and other beverages	9	8	1	89	11
Machinery and equipment	17	16	1	94	6
Paper	9	9	-0-	100	-0-
Petroleum and coal	8	2	6	25	75
Primary metals	19	16	3	84	16
Textiles	11	10	1	91	9
Total	137	113	24	82	18

EXHIBIT 5

It appears that 82 percent or approximately 4 out of 5 of those polled who have adopted accelerated methods for tax purposes use them for all qualified assets. Those companies adopting such methods for all qualified assets may be following a company policy that does not permit deviation even for so called "special cases."

Attention should be called to the petroleum and coal classification in Exhibit 5. It is to be noted that a much higher percentage of responding companies in this industry does not use accelerated methods as rigidly as do other industries. This is, no doubt, because of the limitation on depletion deductions which is characteristic of the extractive industries. By avoiding the use of accelerated methods for depreciation of drilling or mining equipment, these

industries report a higher net income base on which to test the 50-percent limitation on percentage depletion. The 1954 Code limits the allowance for depletion to 50% of the taxable income of the taxpayer computed without any allowance for depletion. So, in order not to risk losing any percentage depletion allowances, which are perishable, this industry group prefers to forego most of the benefits of accelerated depreciation. Presumably the rapid depreciation which is used by some of these companies is relatively minor in amount in order not to jeopardize or reduce their claims to percentage depletion.

Same Methods for Both Books and Tax Returns

Not all companies that adopt accelerated depreciation for Federal income tax purposes are willing to use the same methods for their cost and general accounting records. The question, if you use the liberalized methods for purposes of computing Federal income taxes, do you use the same methods in your general accounting records? was answered by 137 companies. The answers reveal that approximately 75 percent of the companies using the rapid depreciation for tax purposes use the same methods for their internal records and financial statements. This has the advantage of simplicity since only one set of property records is needed to meet the requirements for both public reporting and Federal income tax purposes. Much has been written to the effect that accelerated depreciation more accurately reflects the decline in value of many assets, particularly machinery and equipment. Many believe that "fast" depreciation results in a better matching of expenses with revenues. They point out that a machine's most productive time is when it is new and, as it deteriorates and obsolesces, major repairs and modifications are required to keep it operative. These are the reasons for keeping books and taxes on the same basis.

About one-quarter of those using the liberalized depreciation answered negatively to this question regarding agreement with their general accounting records. Some companies honestly believe that "fast" depreciation does not do a good job of measuring the usefulness of some types of property, such as buildings and, sometimes, automobiles. Others reject accelerated depreciation because they fear to make public the reduction in their earnings arising from use of such methods.

Allocation of Federal Income Taxes

Two accounting methods have been followed by companies using accelerated depreciation for tax purposes only.

One is to treat taxes in the same manner as if straight-line depreciation were

used in computing the depreciation deduction. This, of course, results in a greater tax liability than will have to be met out of current reported earnings in the Federal income tax return. The excess of taxes in the public report over the tax payable may be set up as "deferred Federal income taxes" and carried as a liability, to be paid when and if the depreciation on the tax return drops below that disclosed in the public reports. When deferred income taxes are set up to recognize the current savings which exist by reason of using accelerated depreciation methods for tax purposes and the straight-line method for general accounting records, taxes are said to be "normalized." That is, the tax that would be assessed under straight-line depreciation methods is recognized in the income statement, even though not all of this tax is a curernt liability, and part conceivably might never have to be paid.

The other method is to compute depreciation on the straight-line basis, but to report the actual tax liability. This allows the tax reduction to "flow-through" and increase reported earnings, eventually winding up in earned surplus.

Following passage of the 1954 Code, the American Institute's Committee on Accounting Procedure, in Accounting Research Bulletin, No. 44, *Declining Balance Depreciation,* permitted both of the above methods to be used and in Paragraph 4 of the Bulletin, stated that:

> ". . . in the ordinary situation, deferred income taxes need not be recognized in the accounts unless it is reasonably certain that the reduction in taxes during the earlier years of use of the declining balance method for tax purposes is merely a deferment of income taxes until a relatively few years later, and then only if the amounts are material."

After its publication, there were some misgivings about the freedom allowed under the interpretations given to the bulletin. Apparently a number of cases arose in which serious distortion of net income resulted from the practice of not recording an allocation of the deferred income tax. The upshot of this was that in July, 1958, a revised bulletin[4] withdrew approval of the "flow-through" method and said that "accounting recognition should be given to deferred income taxes if the amounts thereof are material," except for some regulated companies. This, then, is the background for the next question:

> If you use the liberalized depreciation methods for purposes of computing Federal income taxes and use the straight-line method for your general accounting records, do you recognize a deferred account for Federal income taxes?

Approximately 25 percent of those who use the accelerated depreciation

[4] Accounting Research Bulletin No. 44, (Revised): *Declining Balance Depreciation.*

method for tax purposes have permitted their general books of account to remain on the straight-line method. Very few of the companies which use straight-line depreciation for their books do not also recognize the deferral of income taxes in one form or another. It must be presumed that the companies which do not recognize deferred income taxes do not do so because they feel that the amounts are not material.

This almost unanimous treatment of income tax allocation is to be expected. The stand taken by the American Institute of Certified Public Accountants has been bolstered by the administrative policy of the Securities and Exchange Commission. With respect to the "flow-through" method of handling the tax reduction, the S.E.C. says that:

> "Any financial statement filed with this Commission which designates as earned surplus . . . the accumulated credit arising from accounting for reductions in income taxes resulting from deducting costs for income tax purposes will be presumed by the Commission to be misleading or inaccurate despite disclosure contained in the certificate of the accountant or in footnotes to the statements, provided the amounts involved are material."[5]

Use of Additional First-Year Depreciation Allowance

When Congress faced the problem of encouraging business enterprises during 1958 recession, it added Section 179 to the Internal Revenue Code which provided for a special first-year depreciation allowance of 20 percent of an asset's cost, subject to certain limitations. Election to use this special depreciation deduction was permitted for taxable years ended after June 30, 1958, for assets purchased subsequent to December 31, 1957. In general, the act provides for a special depreciation allowance for the first year of 20 percent of the cost of "Section 179 property," which is defined as tangible personal property, new or used, with a useful life at the time of acquisition of 6 or more years. This special allowance is permitted on such property up to a maximum of $10,000 of such property, and can be computed without any reference to salvage value. Regular depreciation, including depreciation using one of the accelerated methods, is permitted in addition to this special deduction.

The tax savings to a major company would not be very great, because this allowance would usually be of material aid only to a small business. The maximum benefit that could accrue to any of the companies made a part of this questionnaire survey would be 52 percent of 20 percent of $10,000 or $1,040.

[5] *Accounting Series Release No. 85*, Securities and Exchange Commission, February 29, 1960, p. 7.

Considering the clerical work needed to handle the special assets so treated, many companies would not consider it worthwhile. The question was:

> Have you computed any first-year depreciation under the 20-percent rule for purposes of computing Federal income taxes?

The answers to this question are tabulated in Exhibit 6.

Use of First Year Depreciation Under the 20% Rule for Federal Income Tax Purposes

Industry	Total Industry Response	Answers		Percent	
		Yes	No	Yes	No
Automotive, aircraft and related industries	21	7	14	33	67
Building materials	10	3	7	30	70
Chemicals and drugs	8	3	5	38	72
Electrical and electronic	8	2	6	25	75
Food, meats, baking and milling	21	6	15	29	71
Liquor and other beverages	11	4	7	36	64
Machinery and equipment	22	7	15	32	68
Paper	10	3	7	30	70
Petroleum and coal	10	-0-	10	-0-	100
Primary metals	19	3	16	16	84
Textiles	11	2	9	18	82
Total	151	40	111	26	74

EXHIBIT 6

One of the most surprising results of this questionnaire is the number of these relatively large companies that have "reached in" under The Small Business Tax Act of 1958 to grab the special deduction on first-year depreciation. How can we account for this? Because of the high rate of income taxes many companies have adopted a program of tax management, under which it becomes a policy to search for every legitimate means to reduce the tax bill. The tax accountants in these companies may regard themselves in an indefensible position if they should fail to recommend the adoption of even so small a tax "break" as that permitted on depreciation by this act.

If the special depreciation is worth considering, certain aspects will require advance planning. Useful lives of both new and used property must be considered in order to make the most advantageous use of the 20-percent deduction. Ordinarily, unless relative salvage values produce a different result, it will be of greater advantage to apply the 20-percent allowance to used prop-

erty and to longer-lived assets, than to new assets and short-lived assets. The timing of the purchase may be important also. For instance, where a company plans to purchase two $10,000 pieces of equipment near the end of the year, it might be wise to buy one at the end of the year and the other at the beginning of the next year in order to qualify for the allowance in both years. Of course, in a large company, the problem of having enough new acquisitions each year to qualify for the special deduction is not important. But, these facets of handling depreciation under the Small Business Tax Act of 1958 are ones which, however small, provide the incentive to the tax accountants in a company to be timely in appraising and in providing impetus to action.

Although only about one out of four of the companies polled have availed themselves of this special deduction, this result does seem rather large when the size of the respondents is considered. If the poll were conducted among smaller companies, an even greater percentage of affirmative answers could be expected.

Finally, we deal with the answers to this question:

> If you have computed any first-year depreciation under the 20-percent rule for purposes of computing Federal income taxes, have your general accounting records been kept on the same basis?

This question was answered by all the forty companies involved; 29 positively, 11 negatively. An analysis of the 11 negative answers reveals that in 9 cases the companies are following the policy used with respect to the handling of the same problem under accelerated depreciation methods. An analysis of the affirmative answers discloses the same similarity in treatment of book accounts. All but one of the affirmative answers to this question indicate that the companies are following the same policies, as far as their book treatment is concerned, in the handling of depreciation under both situations. Altogether, only three of the forty using the 20-percent first-year depreciation allowance handle their accounting records any differently for it than they do for accelerated depreciation methods. This serves to confirm what one would suspect to be true about a circumstance which would not be material to any one of the companies responding to the survey.

A Significant Change

Few revisions in tax laws have resulted in changes which affected so many taxpayers' accounting policies as the 1954 Code which permitted the use of accelerated depreciation methods in computing deductions for Federal income taxes. The entire history of property accounting in this nation has been based

on straight-line depreciation; suddenly companies began using or contemplating the use of one or more of the accelerated depreciation methods both for tax purposes and for internal accounting records and published reports. For most of these companies, accelerated depreciation has already resulted in substantial benefits through tax deferments and tax savings. This was the intent of the law; to increase the amount of funds spent for capital goods by increasing the rate of tax-free capital recovery. The Congress in providing for "fast" depreciation has exhibited a sympathetic understanding of the risks that business must take in investing money. It has also been realistic with its approach to providing impetus to the growth of our economy.

A factor to be lamented with regard to accelerated depreciation is that it has tended to increase the number of items necessary to reconcile public reports and tax returns when accelerated depreciation has not been used for both purposes. Accounting is already complex enough without the addition of "deferred tax liabilities" and footnotes to the balance sheet describing additional unusual aspects with regard to depreciation practices. Can we afford to add to this confusion? The easy solution to this problem would be for companies adopting accelerated depreciation for tax purposes to utilize it for public reports also. Of course, this is not possible for all companies. Public utilities, for example, are excluded from the report requirements of the revised Bulletin 44. What, then, is the answer? Perhaps our most understandable solution is to credit accrued depreciation applicable to such assets in recognition of the future loss of deductibility for income tax purposes. This is recognized as an acceptable alternative by Bulletin 44 and rids our balance sheet of a nebulous term, of the full implications of which the average reader would be uncertain.

Finally, an interesting but not necessarily significant study could be made analyzing those companies which have not elected to use accelerated depreciation for tax purposes. Some of the reasons for not using it have already been mentioned. At least part of the companies have adopted reasoned policies, right or wrong, for rejecting its use. But sometimes a company policy on such a matter may hinge on the personal opinion or prejudice of a single personality within the organization. When such a policy has been formed in error, internal and external pressures eventually result in a move to conformance with that which has proven beneficial to other companies. This has been true of accelerated depreciation in the years since it was first adopted and may account for the switches from the straight-line method, which are now being contemplated by the minority still using this method. Certainly, it appears that the companies not presently using accelerated depreciation should review their policies to make certain that they are not ignoring any advantages it may have for them.

The Learning Curve — A Basic Cost Projection Tool

by MARVIN L. TAYLOR

ANYONE managing an enterprise, whether it be a one-man operation or a large corporation, is faced with the common problem of projecting costs. When it is realized that a business exists to earn a profit and that every sound decision must serve this purpose, it becomes easy to appreciate the importance of cost projections as a basis for decision making. Since this is a universal problem, it is not surprising that several methods of projecting costs have been developed and are in regular use in business today. These techniques are so common that they are sometimes used without being recognized or considered "cost projections." Nevertheless, the answers developed predict the effect of management decisions and actions, and so are true projections.

For many years there have been three traditional techniques used for cost projection:

1. *Recent experience data.* Companies in mass production industries have developed tested methods of determining the costs of their operations. Examination of these costs and correction for known changes to come, plus an allowance for contingencies, permit very accurate forecasts of future costs of producing the same part.
2. *Similar parts data.* If an old part on which costs are available is similar to a new one on which a projected cost is desired, we can make dependable predictions by examining the cost of the similar part and adjusting for known changes and contingencies. Projections based on similar parts are slightly more hazardous than those based on the same part.
3. *Engineering standards and references.* When no data on the exact or a similar part are available, cost projections can still be made by analyzing the operations called for and applying tested standards to the operations. This technique is regularly used in job shop operations and in the construction industry.

Upon examination of these accepted methods of cost projection, it becomes apparent that the use of recent experience data on the same part or the use of

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similar part data is ideally suited to mass production industries. Such projections assume a basis of dependable and consistent data. The use of engineering standards and references, on the other hand, obviously meets the needs of the construction companies or others which must make one item or a very small number of items of a complex nature.

The Learning Curve Theory

Some industries fall into an area between mass and single-item production. For example, the aircraft industry produces relatively small numbers of very complicated items. Cost projections under these conditions require consideration of a fourth element, not necessary when dealing with mass or single-item production problems. This fourth element has been termed "learning."

Historically, the idea of an improvement or learning curve was first published in 1936 by T. P. Wright. A number of writers have published articles on the subject since. Of note is the work of J. R. Crawford of Lockheed Aircraft Company and a publication of the Stanford Research Institute, entitled "Stanford Learning Curve." Data have been collected by the Air Force over a number of years, which support the learning curve theory as applied to large airframe sections. Application of the theory to comparatively small machining and assembly jobs is a more recent development.

"Learning" is the expression of the thought that "every time you do a job you will do it better than the last time." This idea is the entire key to the learning curve theory of cost projection. At this time we should answer some questions concerning this idea.

Does Learning Actually Exist?

In answering the question of the reality of learning, first let us examine our own personal reaction to the thought. Each one of us feels that each time we do a job, we do it a little better than the last time; so, on a personal basis, we find no rejection of this theory. Considering the question on a national level, we find again that, as far back as records are available, this country has constantly improved its rate of productivity; so, here again, we find confirmation of the idea that every time you do a job you do it a little better.

Looking now at a specific industry, we find that the manufacture of cans has continued to improve with the same basic equipment and methods from a speed of about 250 cans per minute in 1940 to a speed of over 500 cans per minute in 1955. The same trend has continued in this industry since 1906 so

that it seems evident that "learning" has existed in this industry over an extended period of time and is continuing today.

Therefore, we can make the assumption that learning will continue indefinitely, providing the forces that result in learning continue to be applied.

What Are the Forces That Result in Learning?

When we think of the forces that cause learning it must be in terms of the basic thought already stated, "Every time you do a job you do it a little better." The forces that effect learning include:

1. *Man on the job.* By this we mean the individual who physically performs an operation to produce a product. It is obvious that this man's training, experience and skill will have an effect on learning. Not quite so obvious but of significant importance are all the related personnel whose coordinated efforts are required to complete an operation: the material handling and supply people affect learning, inspection personnel can at times have a dominant effect, maintenance and service personnel are a part of the total job.
2. *Supervision and staff.* By this we mean the direct supervisors on the floor who concentrate on the seven basics of foremanship—men, material, machines, cost, quality, safety and housekeeping—as well as the higher echelons of management and related staffs. The work of this group as it plans for the proper coordination of effort and provides solutions to problems has a definite effect on learning.
3. *Methods.* How our work is performed has an obvious effect on learning. Since the items we make are newly created designs at the start of a program, it is to be expected that the original concept of "how to do it" is imperfect. The original tooling, facilities and processes require review and alteration to more effective methods as a program gets under way. The "convenience tool" developed on the floor can have a significant effect on learning. Continuing re-evaluation to adjust to changing workload and techniques is essential to learning.
4. *Production rate.* When a program is scheduled at a predictable rate over a reasonably long period of time, significant learning will be achieved as the job gathers momentum. Most rapid improvement will occur when the production unit is fully loaded.
5. *Lot size.* When an item, because of its nature or of schedule, must be batched and run as a group, the advantages of continuous production are lost. Even so, attention to set-up time, cycle time, splits, storage and handling, and the other factors entering into economic lot size will result in learning through control of lot size.

These are forces which, if applied continuously, will result in continuous learning.

The Learning Curve Formula

The idea that, "every time you do a job you do it a little better," requires further refinement to be of maximum use. The idea must be expressed in numbers if it is to have any practical value in cost projections.

People with a knowledge of mathematics can help us on this problem. However, in so doing, we find that the basic idea must be restricted; instead of talking about doing any job a little better each time we do it, the idea must be narrowed to *"every time you double the quantity, the unit hours will be reduced by a fixed percentage."* When we define "learning" in this manner, we can write a formula to express the idea[1] which, when plotted on arithmetical graph paper, appears as shown in Exhibit 1.

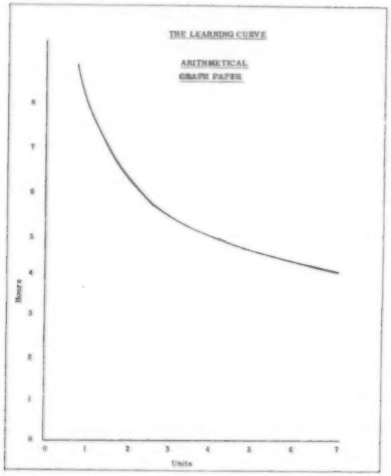

EXHIBIT 1

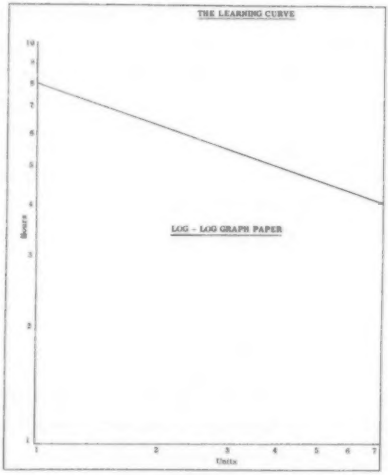

EXHIBIT 2

The hours will drop very rapidly at first and later reach a point at which reduction is very slow as the number of units increases. The very same formula

[1] For those interested, the formula is $Y = KX^{-N}$, where Y = unit hours, K = hours for the first unit, X = unit number and N = expression of learning. The most bothersome element of this formula is the exponential (X^{-N}). Although it can be translated into numbers by use of logarithms, this tedious and unnecessary job can be avoided by using tables which show all of the values of X and N that are likely to be needed.

EFFECT OF AN 80% LEARNING CURVE

Quantity									Unit Hours
			1						100
Doubled	it	becomes	2	Unit	hours	X	80%	become	80
"	"	"	4	"	"	"	"	"	64
"	"	"	8	"	"	"	"	"	51.2
"	"	"	16	"	"	"	"	"	40.9
"	"	"	32	"	"	"	"	"	32.7
"	"	"	64	"	"	"	"	"	26.2
"	"	"	128	"	"	"	"	"	20.9
"	"	"	256	"	"	"	"	"	16.8
"	"	"	512	"	"	"	"	"	13.5
"	"	"	1,024	"	"	"	"	"	10.7

EXHIBIT 3

when plotted on log-log paper is shown in Exhibit 2[2]. The use of log-log paper has two important advantages:

1. It permits easy determination of learning rate when actual data are plotted.
2. It provides a graphical means of observing the actual learning rate in comparison with the projected rate and so verifying the accuracy of the projection.

[2] The mathematical proof is simple:

Step 1 — Basic formula $Y = KX^{-N}$

2 — Take log of both sides: $\log Y = \log K - N \log X$

3 — Write formula for straight line $Y = MX + B$

4 — The equations in Steps 2 and 3 are of the same form; therefore, it follows that formula (1) will be a straight line when plotted on log-log paper.

Experience in the use of logarithms is not required in making cost projections. The one point of importance here is that the learning curve formula is a straight line on log-log paper.

Approval to Application

Now we should gain some idea of the effect of this formula. Let us assume that we know a job will improve at an 80-percent rate and that 100 hours will be required to produce the first unit. The learning curve formula says, "every time we double the quantity, the unit hours will be reduced by a fixed percentage." Exhibit 3 shows the results.

It may seem a little startling to seriously expect to achieve a reduction from 100 hours down to 10.7 hours per unit in 1,024 units. However, actual case records show that improvement of this magnitude can be expected.

Once a learning curve has been constructed for a particular program, management has a graphic tool that provides the normal advantages derived from routine cost projections. By merely reading from the charts, answers can be readily obtained to questions such as:

1. What will the unit hours be at Unit X? at Unit Y?
2. What will the cumulative average hours per unit be at Unit X?
3. At what unit will the program break even?

Growing Acceptance

The learning curve theory has proved itself to be a valuable cost projection tool in industries that fall into an area between mass production and single item production. With the wide acceptance of this method, particularly in the aircraft field, the learning curve must be ranked with our traditional cost projection techniques.

Cost Control in Product Feasibility Decisions

by YASUO YOSHIDA

ANY SUCCESSFUL cost control program which is to perform a vital part in decision-making for acceptable profits, must be designed to meet the specific requirements of management. It must be adapted to the inherent attitudes and conditions of the particular industry as well. To be successful, a program must be accepted with the understanding, participation and cooperation of all—those responsible for actions which incur costs and those responsible for the preparation and reporting of cost data.

In order to better ascertain the features of the cost control program presented here, let us describe the nature of the toy industry. In this seasonal and competitive industry, there are definite cycles which are caused by the buying habits of the purchasers, as well as the ultimate consumer. Primarily, items are purchased for summer play or for Christmas gifts. In this fast-moving era of jet airliners, satellites and astronauts, children are constantly seeking new adventures and imaginary episodes in their playtime activities. Consequently, the deterioration of demand being quite rapid, a constant search for novelty in old ideas and for new product is essential. This situation creates the need for an extensive research and development activity.

In addition to this industry behavior pattern, our company faces certain areas of concern within its own confines. The company is expanding rapidly both in volume of business and in the type of product manufactured and sold. More complex items are being designed and more intricate mechanisms introduced. The lead time required to produce a new item is longer than ever before since additional effort is necessitated by the more complex products, particularly in the product and tool design and manufacturing. Commitments, much higher for intricate mechanisms, have to be made much earlier. Another area of concern is a trend toward high-priced quality merchandise which creates an abnormal swing in "seasonality," because such items are sold only during the short season prior to Christmas. Capacity must be geared to meet these peak conditions, and yet consideration must be given to minimizing the detrimental effect of the low-volume periods.

In view of these conditions, both in the industry and the company, it was recognized that it was not prudent to operate without having valid cost informa-

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tion on which decisions could be based. Thus, the search for an operable cost control program was begun. The cost control program presented here has proved to be a major stride in the proper direction; with further refinements it will become an even more potent tool for decision-making.

Determining and Developing the Approach

A complete review of the operations and the related costs indicated that, in our case, primary management decisions affecting the over-all profitability are made at the product-selection level. With the method previously used, it was very difficult to measure the profitability of a given product; until a complete product line was established, the over-all effect of these decisions was not determinable. However, as the products were selected, the wheels of the organization began to pick up momentum at such a rate that many times irretrievable costs became a major factor in making subsequent decisions. It was determined that the cost control program had to begin prior to product selection. It was also determined that a system which would accurately estimate the profitability of an item was required at the product-selection level. With this approach, management would have the necessary information to select profitable and eliminate marginal and unprofitable products. Their decisions would then bring optimum returns.

With the approach to the program defined, each item of cost was reviewed to determine the method by which it could be directly applied to an individual product. A preliminary review indicated the following four major categories of costs:

1. *Costs that vary with the sales value of a given product.* Sales commissions, cash discounts, royalties, etc., paid on the sales price or invoice value fall into this category.
2. *Costs that vary directly with the volume of units manufactured or used,* with no relationship to sales value. Materials, direct labor, indirect labor, shipping and handling, are examples of this type of costs.
3. *Fixed costs of creating the product.* These costs, incurred in getting the product to the production stage, are tooling, line set-up, research and development, etc., and bear no direct relationship to the selling price of the product nor to the number of units to be manufactured or sold.
4. *Factory and general overhead* that could be reviewed on a budgetary control basis but was not allocated to a particular product in any previous attempt at cost estimating. This final type of cost was recognized to be the most critical.

The first three categories of cost were clearly identifiable by product. What then could be done to the fourth category in order to assimilate it with the others? A detailed and critical analysis of the overhead for the past few years brought out a startling concept which was completely contrary to the accounting methods employed by the company.

In such a rapidly expanding company interested in creating efficiencies in all applicable costs, the well accepted cost accounting principle dealing with costs as variable, semi-fixed and fixed appeared invalid, when considered over an extended period. Exhibit 1 is indicative of the data that was compiled (amounts in this and other exhibits are for illustrative purposes only). Overhead was increasing at a more rapid rate than gross dollar volume. During the first two years analyzed, a ratio of overhead to gross dollar volume of 25 per-

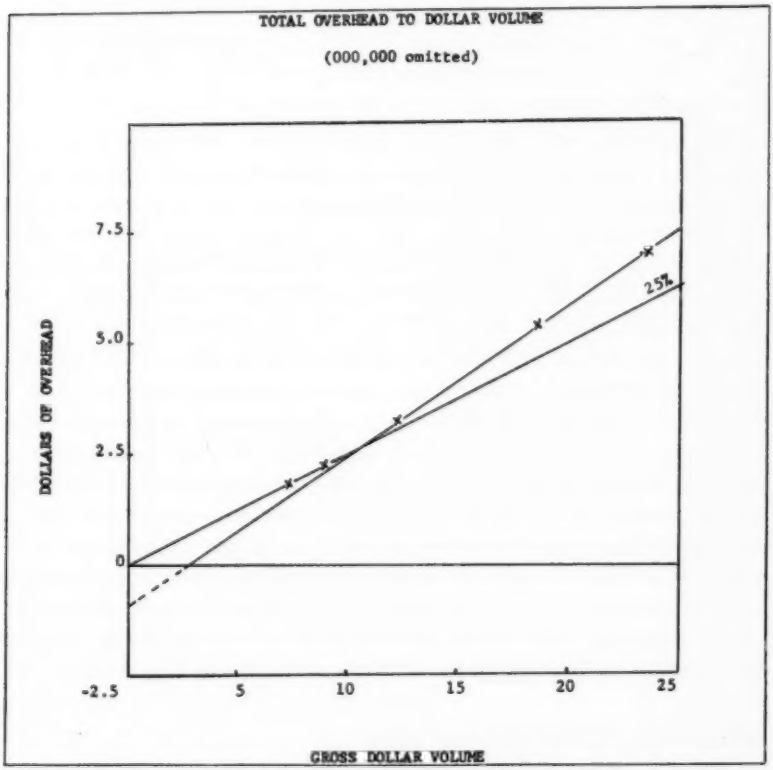

EXHIBIT 1

cent was disclosed. In the subsequent three years a completely different relationship was experienced. Why should this be? Were the managers lacking the ability and judgment required? Each was believed to be capable. Cost consciousness was an unwritten law. Then why should the overhead increase out of proportion to volume? Some of the many explanations given for the disproportionate change, were:

1. A rapid rate of expansion leads to incurring more marginal (less productive) costs.
2. Additional overhead was expended in a concentrated effort to reduce direct costs.
3. As the "stakes" increased, the need for more complete controls created additional overhead expenditures.
4. Additional design and engineering effort was consumed to bring out more intricate mechanisms.
5. Sales promotion was less effective because of similar promotion on the part of competitors, thus reducing volume and the overhead distribution base.

This reasoning, when subjected to critical analysis, was found to be basically valid. However, underlying all the explanations given was one basic, yet overlooked, principle. Overhead costs, being incurred as a result of effort required by management decisions, need not fluctuate directly with the dollar volume of the business. The total amount of overhead effort required in the manufacturing and selling processes of one product could differ immensely from that required in another. The effort varied not only because of volume differences but also because of the relative material costs, number of parts involved, labor hours required to produce a unit, number of machine hours, etc. In some departments, costs were incurred because of the quantity of products manufactured or sold. The volume of each item had no bearing upon the amount of effort required. From an overall standpoint, the whole organization was geared to the protection of investment in projects; consequently, the size of each project undertaken determined the degree of control and effort put forth. Thus, the concept of need for complete overhead allocation and effort control was determined. The formulation of a method to accomplish the segregation of efforts into those that varied with dollars volume, production costs and the number of products in the line became a matter of simple mechanics.

Mechanics of Overhead Allocation

To apply the basic principle of participation in order to promote under-

OVERHEAD ALLOCATION PERCENTAGE CHART

DEPARTMENT	TYPE OF EFFORT OR BASIS					
	SALES VALUE	DIRECT LABOR	NO. OF PARTS	NO. OF PRODUCTS	SIZE OF PROJECT	TOTAL
A	20%	30%	10%	15%	25%	100%
B	10	60	-	10	20	100
C	50	10	-	15	25	100
D	-	60	10	10	20	100
E	30	20	20	10	20	100
F	10	10	-	20	60	100

EXHIBIT 2

standing and cooperation, all department heads were contacted and the program was explained. Discussions resulted in expressions of opinions by them as to the types of effort or other basis that controlled the amount of expenditures in their departments. These controlling bases were resolved to be:

1. Sales value.
2. Direct labor.
3. Number of parts.
4. Number of products.
5. Size of projects.

As more than one type of effort or basis was generally found to be controlling expenditures, a percentage of the total was assigned to each. A master allocation chart was prepared from the information obtained (Exhibit 2). By applying the percentages for each department to its current expenditures, it was possible to arrive at the total dollars allocable by type of effort or basis. The final dollar allocation chart appeared as in Exhibit 3. The application of the total dollar amount for each type of effort to the basis of total company activity produces an overhead cost estimating rate.

The rates so calculated are incorporated into a cost summary. It is recognized that individual rates could have been established for each department for each basis but, in order to reduce the number of computations required for

OVERHEAD ALLOCATION DOLLAR CHART (000 omitted)						
	TOTAL	ALLOCATED BY EFFORT OR BASIS				
DEPARTMENT	OVERHEAD	SALES VALUE	DIRECT LABOR	NO. OF PARTS	NO. OF PRODUCTS	SIZE OF PROJECT
A	$ 100	$ 20	$ 30	$ 10	$ 15	$ 25
B	750	75	450		75	150
C	500	250	50		75	125
D	300	-	180	30	30	60
E	250	75	50	50	25	50
F	600	60	60		120	360
TOTALS	$2,500	$ 480	$ 820	$ 90	$ 340	$ 770
BASIS		$22,325M	500M Hrs.	300,000M	34	$3,850M
RATE		2.15%	$1.64/Hr.	$ .30/M	$10,000	20%

EXHIBIT 3

cost estimating, they were combined. Since this method leaves much to be desired as to the validity of the effort allocation, a program is now under way to develop a more accurate determination of actual effort expended.

The resulting format of the Cost Estimate Summary, simplified for ease in presentation, appears in Exhibit 4. The various rates developed as has been explained, are traceable from Exhibit 3 into Exhibit 4 where they are identified by "box lines". The "break-even quantity" computation is used as a quick-sight factor to determine feasibility of production. The cost estimate summary became the hub around which the spokes of the control program were to operate and, with proper evaluation and usage, was to become a more potent tool in making management decisions.

The Program in Action

To integrate the overall control program, the costing format established was

COST ESTIMATE SUMMARY

ITEM NO. 100 NAME Product C

COSTING STATUS AND REMARKS Feasibility of Manufacturing

SALES PRICE			$1.0000
LESS: VARIABLE PERCENT COSTS			
Variable Sales Costs	11.60%		
Variable Overhead Costs	2.15		
Royalties	2.50		
Returns Costs	1.00		
TOTAL VARIABLE PERCENT COSTS	17.25	$ .1725	
VARIABLE COSTS PER UNIT			
Material Costs (includes spoilage)	$ .3750		
Direct Labor (includes P/R Taxes, etc.)	.0910		
Manufacturing Burden	.0210		
Freight Costs	.0350		
Overhead Allocated			
On Direct Labor Hours at $1.64 per hour	.064		
On Number of Parts at $.30 per M parts	.006		
TOTAL VARIABLE COSTS PER UNIT		.5920	
TOTAL VARIABLE COSTS			.7645
PER UNIT CONTRIBUTION TO FIXED COSTS AND PROFIT			$ .2355
PERCENT CONTRIBUTION			23.55%
FIXED COSTS			
ADVERTISING		$15,000	
RESEARCH AND DEVELOPMENT		10,000	
TOOLING COSTS		30,000	
OVERHEAD		10,000	
SUBTOTAL OF FIXED COSTS		$65,000	
COMPLEXITY FACTOR (20% OF SUBTOTAL)		13,000	
TOTAL FIXED COSTS		$78,000	
BREAKEVEN QUANTITY ($78,000/$.2355)			331,210

EXHIBIT 4

applied to the search, design and development, and production activities of each product. Basically, the critical phases were:

1. *Feasibility phase and product selection.* The control and accuracy of costing data prior to the product-selection point and the method to be used in determining relative profitability.
2. *Design and development phase.* The maintenance of current cost information during the design and development phase to give management some flexibility in altering the plan.

3. *Standards vs. actual costs.* The review of actual performance during the manufacturing and selling processes, against basic standards and goals previously established.

Feasibility Phase and Product Selection

During the feasibility phase, countless ideas are being investigated by the research and development department to determine the ones that should be presented for consideration by management. Those ideas, representing potential new products, are then costed on the cost estimate summary and potential unit sales ranges are obtained from the marketing division. The per unit contribution to fixed costs and profit is applied to the top and bottom of the sales range figures and, from the resulting amounts, the total fixed costs are deducted. This calculated profit or loss on each item at the top and bottom of the sales range is then plotted against the fixed costs (investment required) in the manner illustrated in Exhibit 5.

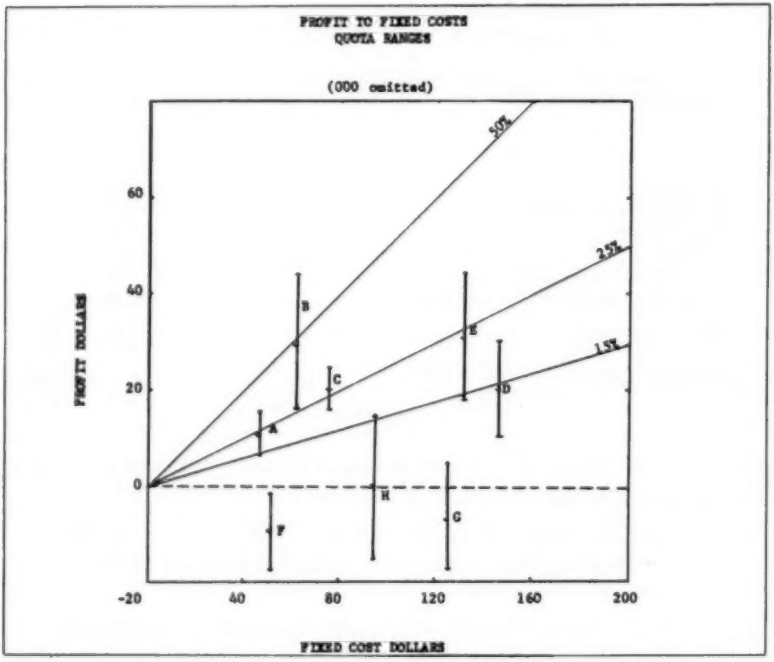

EXHIBIT 5

From this illustration, it is quite obvious that Products A, B, C, D and E should be profitable and that F, G and H are marginal or potentially loss items. However, due to concern about the overhead effort expansion, another check is made. It must be determined whether the inclusion of the five favorable products will meet the minimum volume goal and whether the effort required by the new products will exceed that which can be handled efficiently by the organization. If the effort required is greater than the efficient expansion limit, the products providing the most return in proportion to output expended are selected. The comparison of return to output expended is most effectively presented in a chart showing the relationship of profit to overhead effort dollars, as in Exhibit 6.

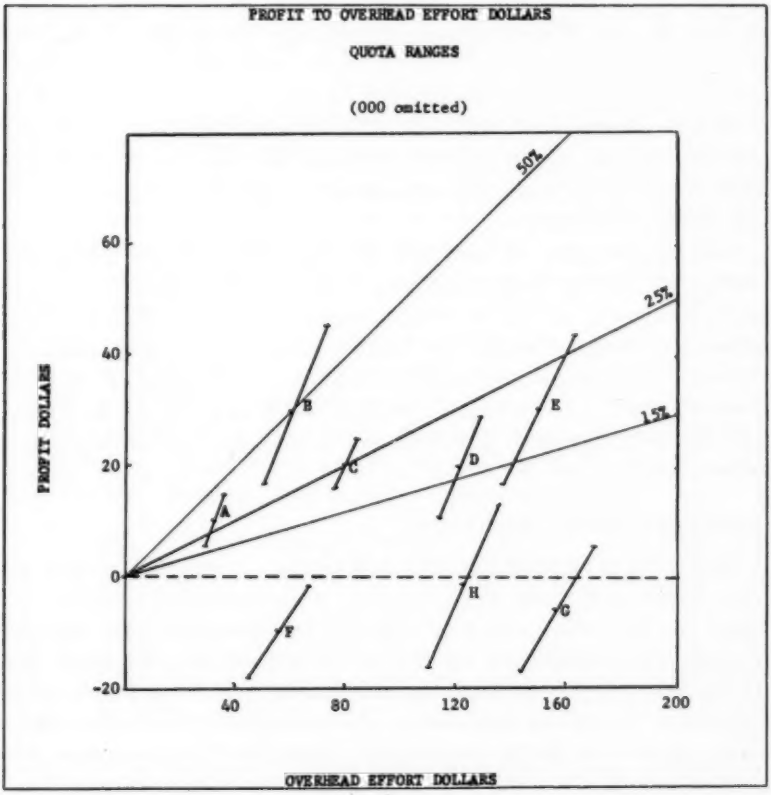

EXHIBIT 6

CUMULATIVE EFFECT TABULATION
(000 omitted)

PRODUCT	SALES VOLUME		OVERHEAD EFFORT		PROFIT		% PROFIT
	EACH	CUM.	EACH	CUM.	EACH	CUM.	TO O/H
B	$180	$180	$ 60	$ 60	$ 30	$ 30	50%
A	100	280	30	90	10	40	33.3
C	190	470	80	170	20	60	25
E	600	1,070	148	318	30	90	20.3
D	375	1,445	120	438	20	110	16.7

EXHIBIT 7

This visual method of presentation does not show the cumulative effect of the various products. It is, however, computed and shown by a tabulation in order of rank by the percentage-return-on-overhead effort at the midpoint of the sales ranges (Exhibit 7).

Individual decisions are facilitated by establishing minimum return percentages. A cumulative effect tabulation (similar to that in Exhibit 7) can be maintained so that the limit of efficient expansion will not be exceeded. Let us assume a minimum volume goal of $900,000 and limit to efficient expansion of $340,000. According to the cumulative effect tabulation, Products B, A, C and E can be added to the product line with reasonable assurance that the over-all plan can be accomplished. The design and development work on the products selected can then start.

Design and Development Phase

During the design and development phase, the cost estimates are kept current as changes are made, and management is informed of any significant variances. As the design process progresses, other departments begin their preliminary work in preparation for the manufacturing process. Immediately, prior to the pilot run, the cost estimating responsibility is transferred from the research and development department to the manufacturing department. This is done, primarily, so that the manufacturing department will become more aware at that point of the methods to be used in the manufacturing process and, secondarily, in order to audit and verify the cost estimates issued previously.

Any differences noted are then reviewed with research and development department before a revised cost estimate is issued to management or, if variances are of minor significance, only a brief memo report is issued.

Inasmuch as the estimates, both in cost and in volume, are being changed from time to time to reflect current conditions, management is informed of any significant fluctuations in the over-all profitability of the complete line. The tendency for the costs to "creep" and for volume estimates to change, may not affect an individual product to an alarming degree, but the cumulative effect of these changes may cause some major alterations by management.

Immediately after the pilot run has been completed, base standards are established for the product. The overhead base standard rate is predicated upon the prior year's experience. The cost estimate incorporating the base standards is prepared by the cost accounting department, because of the specific requirements of the cost accumulation system. A corollary of this procedure is a second audit and verification of the cost estimate.

Certain by-products of the cost estimates are developed after the base standards have been established. The aggregate amount of overhead, generated through standard cost estimates of all products, is computed on a departmental basis. As a cross-check, the results are then compared against the overhead budgets requested by the various departments. Also, through the information on the cost estimates, it is possible to indicate changes in workload requirements for a particular department so that the budgeting department is able to better counsel the department managers.

After the item is in production, variances from the base standards are segregated through a sophisticated cost system. The system that was developed provides for the reporting of performance to date in a form comparable to the basic costing format established. It is not our purpose here to describe in more detail this effective method of recording and reporting the mass of data involved. Basically, the reports can be segregated into two major types:

1. Reports that keep foremen and supervisors informed on a current basis, reporting on specific types of cost. Typical examples of these reports are:
   a. Daily labor performance reports.
   b. Weekly labor performance reports.
   c. Monthly purchase price variance reports.
   d. Monthly material usage variance reports.
2. Summary reports given to top management to reflect (1) over-all profitability with variances from goals and (2) profitability by product with variances from their individual goals. In order to

avoid excessive reporting, only critical products and significant variances are reported. Examples of these reports are:

a. Monthly calculated profit or loss to date, with variances.
b. Projected profits for the year as revised monthly.
c. Products with significant variances (reported monthly).
d. Supporting schedules on critical items of cost, such as overhead, tooling costs, etc.
e. Weekly performance on manufacturing input, order receipts, shipments, employment strength, etc.

With this information, management is able to determine areas in which action or review is required. A constant effort is being made to improve the timeliness of reporting the information, in order that critical conditions or significant variances will not be overlooked for any period of time.

The Benefits of the Program

The program described utilizes some concepts and principles that are unique in management theory. The information and decisions that have arisen through the implementation of these concepts and principles have proved effective during the three-year life of the program. Some of the major benefits can be summarized as follows:

1. *Complete allocation* of overhead by product enables management to determine the profitability of a new product at the product-selection point. This assures management that performance can be accomplished according to decisions made.
2. This program records and reports data in such a way that the control of cost can be exercised in advance. This is done through prediction of workload, by departments, required for new products which management adds.
3. Control of specific items of costs to pre-determined goals can be maintained and the effect of variances from such goals on the overall profitability of operations as well as profitability of individual products, determined on a timely basis.
4. The program meets the specific requirements of those who make it operate and those to whom the information is directed. This was ensured by its design and development through the cooperation and participation of the entire management team.

Overhead behavior is governed primarily by the varied types of effort resulting from management decisions. This cost program has given effect to this fact, and the benefits which resulted have more than compensated for the costs expended in implementing the program.

Better Control of Surplus Parts

by C. HAROLD WEBER

SURPLUS PARTS create one of the most frustrating problems that management encounters in controlling investment in inventories. Excess parts accumulated at the end of a project also represent a direct drain on profits. Generally, the larger the company or project, the greater the volume of parts on hand at the end of a program. This occurs despite the best efforts of supervision to prevent it.

As a rule, when management becomes aware of a surplus condition, an attempt is made to divert parts to spares or to other programs. This is usually an impractical solution because examination normally shows that not only have these requirements been provided for, but often these programs show surpluses, too! Ultimately, the parts are accumulated at the next stores housecleaning and are sold as scrap for a fraction of their original cost.

The Controller's Responsibility

When the controller reviews the overall operation of the program, it generally is not long before he asks the question, "Why do we have so many parts left over?" In a large company it may be hard to give a clear, convincing answer to this question due to difficulties encountered in pinpointing the areas of responsibility. The responsibility could rest with the production control, material control or procurement functions or with the controller. To suggest that the controller has a responsibility for surplus parts might, on the surface, seem a bit surprising. But, regardless of other departments' responsibility, the controller must accept his share. Surplus parts represent additional costs, in many cases wholly unnecessary costs. And one of the controller's most obvious and important functions is supplying tools for the control of costs.

Understanding the Surplus Problem

In order to understand the surplus parts problem, it is necessary to break it down into its elements. Correcting the causes which result in surpluses of company-manufactured parts is usually much easier than eliminating the causes

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of surpluses related to parts manufactured outside. This is because certain trade practices relating to the latter are frequently involved, and it is obviously far more difficult to exercise control over an outside manufacturer's operations. Two significant factors that contribute to the creation of surpluses of outside-manufactured parts are engineering changes and traditional procurement practices.

Engineering changes can be broken down into two major groups: those which result from product improvement activities within the company and those which are requested by the customer. In the latter instance the company often has little or no control and all affected parts on hand become obsolete. In the former instance, it is frequently possible through proper planning to commence use of the new parts after existing stocks of the superseded parts are depleted. Changes in both of the above areas influence the surplus parts situation.

The Phenomenon of "Cumulative Procurement"

A more insidious cause of surpluses is what we might call "cumulative procurement." It results largely from practices which stem from company policies and procedures which were established with the best of intentions. It might best be described by citing an example which is neither as exaggerated nor as remote as it may appear. Cumulative procurement can occur in the best regulated companies and frequently does. It is more apt to occur in larger companies than in smaller ones.

Assume that a company has received an order for 1000 units of Item X, which is a manufactured article to be made to the customer's specifications. Each unit will be assembled from about 1000 individual parts. The company decides that the entire order is to be broken up into five releases of 200 units, each conforming to customer requested delivery schedules and shop loading. Without going into all the details, the production control department "shakes down" the bill of material to determine the material requirements. A make-or-buy decision is then reached for the detailed parts. Shop orders are released for the parts which are to be made in the plant, and the procurement machinery is set in motion for the remainder.

The material analyst in examining the procurement list determines that for each unit of product he will need 2 units of Part No. 1234, which means that the basic requirement is 400 pieces for the first release. Fearing a shortage somewhere along the line and knowing that the part will be manufactured outside, he sets up a requirement for ten additional pieces and notifies the material control department that the requirements should be 410 pieces. Material control, knowing that Part No. 1234 will be subject to manufacturing losses be-

cause of its size or the fact that additional work will probably be performed on it in the plant adds a tolerance of 5 percent and prepares a purchase requisition which shows a requirement of 431 pieces.

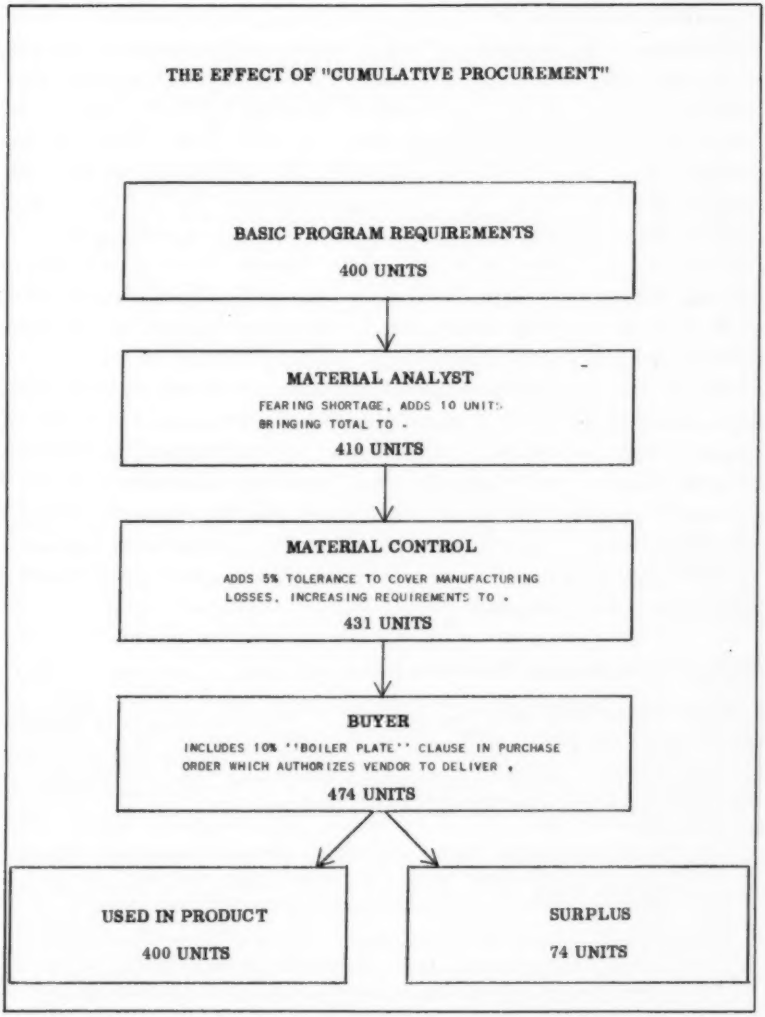

EXHIBIT 1

Upon receipt of the purchase requisition, the buyer writes a purchase order for 431 pieces. But this purchase order includes a "boiler plate" clause which, in effect, allows the vendor a quantity tolerance. Normally, a 5-percent overshipment provision is included. However, depending on circumstances, it can be as much as 10 percent. If the 10 percent clause is used, the vendor can deliver 474 pieces (Exhibit 1).

To summarize the example, the company needed only 400 pieces of this part in the first place. It received 474 pieces! The difference of 74 pieces, most of which will ultimately show up as surplus, represents almost 20 percent of the original requirement. If the company follows the same pattern on the next four releases, it could finish the project with 370 surplus items by the time the whole order is completed. And this situation applies only to this one part. There could be several hundred more items to which this situation would apply.

If we suppose an arbitrary unit cost of $5, a surplus of $1850 chargeable to only one item has been created. It does not take much imagination to see what might happen over the whole program. Is it any wonder that the anticipated profits do not always materialize?

(Not all of the foregoing factors will apply every time and, probably, somewhere along the line some internal controls will be brought to bear on the overall problem to alleviate it. For example, one manufacturer has a category of parts referred to as "high dollar items" which are more tightly controlled than others. Another company takes an inventory near the end of each program, after which the material control department marks each subsequent requisition, "quantity mandatory." However, despite this counter-influence, the problem exists to an important degree).

Measures to Prevent Cumulative Procurement

What can be done about this problem? There are a number of measures which can be taken to improve the situation. To be effective, any action must be supported by top-level management. The minimum that the controller can do is to make sure that the following steps are taken:

1. *Production control.* Actual requirements must be adhered to unless there is an authorized change. Additional quantities should not be arbitrarily added to cover shortages or manufacturing losses.
2. *Material control.* Responsibility for adding in quantitative manufacturing tolerances should be assigned to the material control department and such tolerances must be realistic. If possible, arrange for a physical inventory near the end of each release and adjust the procurement for follow-on releases accordingly.

3. *Outside procurement (purchasing).* Discontinue the practice of adding a tolerance into outside production purchase orders. Train buyers to negotiate for actual quantities required, where possible. Be willing to pay just a little more per unit if this will aid in preventing the surplus problem. The practice of writing purchase orders with a tolerance tends to proliferate to a point where such statements are sometimes included in orders for parts for which tolerance provisions are completely inappropriate. One large company has notified its subcontractors that no further over-deliveries will be accepted, and it now includes a statement on its purchase orders to that effect.

4. *Accounts payable.* Rescind any existing authority under which the accounts payable department is permitted to pay for over-deliveries without obtaining documentary authority in the form of a purchase order change.

If the dollar value of the surplus problem is substantial, the controller might consider the installation of a formal procurement budget program. A budget by part number, indicating quantity required and dollar value, can be established by the cost department from the detailed bill of material. The bill, which is the basis for pricing the end product, is obviously the ideal budget because an unfavorable variance from it, in effect, results in a direct loss to the company. Should the material requirement include a large quantity of parts with relatively low unit prices, it may be advisable to group such parts within the budget structure. The budget should be distributed to all persons involved in the purchasing function. Frequently, this information alone will serve as a deterrent to the creation of surplus. Too often the people concerned do not fully realize the dollar value of the items with which they are working.

As the purchase orders are released, they should be posted to a purchase commitment record which is maintained in the same detail as the procurement budget. Depending on the magnitude of the problem, daily, weekly or monthly reports should be prepared, comparing (by parts or groups of parts) the actual purchase commitments with the procurement budget. This comparison will provide "before the fact" information to serve as a guide for subsequent purchases. Management analysis of unfavorable variances or commitments in excess of budget, will provide the basis for immediate action, which may be one or more of the following:

1. Terminate excess purchases.
2. Determine and eliminate the causes of the excess purchases.
3. Approve the over-buy as a proper insurance against possible part losses or production-line "shut downs" due to part shortages.

A Challenge to the Controller

It would probably be naive to suppose that we could eliminate the surplus problem entirely. In fact, some "insurance" in this area is often necessary to prevent costly production-line shut-downs. But we must be mindful that, for the most part, dollars invested in surplus materials are dollars that reduce profits. For this reason the controller must be ever alert to the surplus problem and must insist upon procedures that will hold it to a minimum. The problem is not an easy one but, if attacked intelligently, it can be solved.

Do Undisclosed Liabilities Distort Financial Statements?

by ROBERT C. MOGIS

PUBLISHED financial statements, summarizing the results of activity over specific time intervals, are not tailored to the wants or needs of any specific group of individuals but, rather, are prepared to disclose information which may be significant to any one or several diverse groups. The statements are not opinions as to future enterprise success or failure, they are a history. Although the accountant does have discretion in recording, organizing and presenting data within limits, he is responsible for presenting facts, not conjectures.

Rarely does the critical reader base his judgment on these reported facts alone. Depending upon his purposes, he pulls information apart here and pieces it together there, in order to grasp what is significant to him. Accounting data, no matter how well presented, cannot encompass all the interplays that affect our economy and the firm. Still, the reader's job would be immeasurably more difficult if he did not have access to meaningful statements from and upon which to draw together his other findings. Accordingly, the accounting profession has tried to make them more and more informative and useful by requiring full disclosure.

Full Disclosure—Two Cases

The requirement for full disclosure has been rigorously applied. For instance, in the Thomascolor case the Securities and Exchange Commission suspended a national firm of Certified Public Accountants from practice before it for ten days as disciplinary action, due to inadequate disclosure of important information contained in the Thomascolor registration statement of 1947.[1] The case was highly technical, but the essential facts are that the S.E.C. took exception to the financial statements as filed with the Commission on several counts, among them:

[1] Abstracted from Official Discussion and Releases, "SEC Accounting Series Release No. 73, The Thomascolor Case," *Journal of Accountancy*, January, 1953, pp. 83-106.

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1. Footnotes revealing the basis of valuation of patents and patent applications, as taken from books of predecessor companies, failed to disclose certain special liquidation preferences, which could benefit one class of stockholders at the expense of another.

2. No mention was made of peculiar dividend arrangements, whereby one class of shareholders could benefit disproportionately.

3. Incomplete information was given in regard to ownership and voting power of one class of stock held by a controlling individual.

In another case, the S.E.C. suspended a national firm of Certified Public Accountants for fifteen days for failure to exercise proper professional conduct in their audit of Seaboard Commercial Corporation and in presenting their opinion on the statements.[2] The commission charged that, along with several other deficiencies, not all relevant information was shown, i.e., net current assets were overstated by the exclusion from current liabilities of a reserve for renegotiation claims. The commission held that the financial statements as a whole and the accountants' certificate "improperly minimized adverse disclosures."

We are not concerned here with the technical details of either case, but it is important to note the S.E.C.'s insistence on full disclosure of significant information, the omission of which might lead to distortion in interpreting financial statements. Several conclusions can be deduced from the S.E.C.'s position in these cases:

1. Notes to financial statements should not be used to state values that should be included in the balance sheet.

2. Disclosure in explanatory material, such as a prospectus or a president's letter, is not adequate; disclosure should also be in the financial statements.

3. Footnotes should be used to present all information concerning the true nature of balance sheet items so that the reader will not be misled. An item that cannot be used in its usual context should be explained.

4. Full disclosure of transactions between management and the company is necessary in the financial statements, whether the facts disclosed might be interpreted as favorable or unfavorable.

5. Footnotes should be carefully worded to preclude misunderstanding.

6. Accountants should not indiscriminately accept management presentations of material items but should use professional care and independence in determining their true nature.

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[2] Abstracted from Official Releases, "Official Summary of SEC Accounting Series Release No. 78 and Statement of Touche, Niven, Bailey & Smart," *Journal of Accountancy*, June, 1957, pp. 60-64.

7. The influence of the S.E.C. on matters of full disclosure though desirable is at the same time a possible threat to the profession—desirable in that it sharpens the accountants' responsibility, undesirable in that by deciding what is and is not proper accounting, it legislates the law of accounting.[3]

What is a Liability?

Critics of present-day financial statements argue that one of the significant omissions or distractions found is the failure to disclose all liabilities and their effects. One of the major "inadequacies in financial reporting (today) centers around the failure to disclose the effects of . . . liabilities."[4] While Paton is critical of the failure of most published statements to reveal "the total of all liabilities, both current and long-term," his criticism is tempered with the recognition that:

> "liabilities which are purely contingent—possible claims, in other words, which may become effective under certain unfavorable circumstances that have not yet materialized—can hardly be given definite recognition . . . except in the form of references to accompanying explanations and notes. Such liabilities do not constitute effective equities at the date. . . ."[5]

This contention is concurred in by Accounting Research Bulletin No. 50 of the American Institute of C.P.A.'s.[6] Those contingencies in which the outcome is not sufficiently predictable should not be recorded in the accounts. But if there is a reasonable possibility of an outcome which might materially affect the financial statements, disclosure should be made, either in the body of the statement or in the notes to it. Examples of these contingent liabilities of losses are pending or threatened litigation, assessments or possible assessments of additional taxes, and guarantees of indebtedness to others. If the outcome is reasonably foreseeable, the amount should be reflected in the accounts. There is no necessity for reflecting in the accounts the kind of risk contingencies to which all or most businesses are subject at any time, such as war, strikes, or depressions, but certainly nothing is lost by indicating in the notes to the statements what the nature of any relevant contingency is, and what plans are being made to meet it.

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[3] Editorial, "Suspension of Accountants by SEC A Dangerous Precedent," *Journal of Accountancy*, January, 1953, pp. 33 and 34.

[4] "The Treatment of Footnote Liabilities," James E. Walter, *The Accounting Review*, January, 1955, p. 95.

[5] *Essentials of Accounting*, William A. Paton, The Macmillan Company, New York, N. Y., 1949, p. 790.

[6] *Accounting Research Bulletin No. 50—Contingencies*, American Institute of Certified Public Accountants, New York, 1958.

The businessman surely faces uncertainty and risk from every direction. Accounting recognition of these potential events might be desirable, from the reader's standpoint, but by their very uncertainty they could lead to misleading inferences. In fact, an attempt to define criteria for the inclusion or exclusion of conditional events of this sort leads to frustration of its very purpose. Presumably "liability" should be definable by some clear-cut rules, but the inclusion of the effects of uncertainties implies the existence of an elastic definition of liability which can be stretched or compressed to include or exclude the results of possible occurrences according to the viewpoint of the statement preparer. We need to look further for a criterion for "disclosability."

Liabilities and the Effect on Income

Most of those who consider the income statement as the central theme of accounting are more concerned with an omission of a liability that would overstate income by not recording an offsetting expense, than they are in accounting for all liabilities *per se*. A partner of one of the large C.P.A. firms tells of an instance which occurred when he was a junior working on the audit of a large oil company. He went to the senior-in-charge and excitedly showed him evidence of an $800,000 undisclosed liability. "It sure is," said the senior "but we won't book it because it will only increase inventory-in-transit, and will not materially affect the current ratio." My own experience has been that the auditors-in-charge were always more interested in undisclosed liabilities that would affect the income statement rather than those that merely increased the assets.

The concern over recognition of expense appears to arise out of emphasis on the matching principle, i.e., the matching of periodic revenue with appropriate expense. It sometimes happens that in attempting to recognize the proper matching expense, the accountant creates a credit that does not fit the usually accepted legal meaning of liability, i.e., obligation. Consequently other titles have been used to describe the liability, such as "deferred credit." This title is generally created to connote income not yet earned and, presumably, there is an obligation to return it in the event of nonperformance. Yet, if we subscribe to the "going concern" concept of enterprise, there is no intention at all to return it. Many of the "deferred credits" are not true debts, in the sense of an expectation to pay out amounts, but are to be transferred to an income category upon completion of some act. Writers of accounting have been perplexed as to how best to describe credits that arise as the result of "matching."

Again, we are faced with an unsuitable criterion for inclusion or exclusion

of items as liabilities. The rules for attaching the liability label do not appear to rest soundly on a notion of "debt" in the legal sense, nor on a notion of an undisposed-of temporary storage place for credit balances. Available definitions of "liability" lead to one conclusion: liabilities, like an accordion, can expand or contract to play the right note at the right time, at least in professional opinion, but if the wrong note is played, it encounters repercussions from the critics.

It would be desirable to fashion a cohesive plan for handling all liabilities which would meet the needs of the reader. If the legal debt approach and the expense-recognition approach have proved inadequate, what other ways are there for structuring an all-inclusive plan for recording liabilities? In the remainder of this article, we try another approach, one we shall call the service-potential recognition plan.

Plan for Recording Liabilities

Up to now, we have discussed liabilities from the outsider's viewpoint, trying to get a fleeting glimpse of the inner workings of the enterprise. The continuously improving accounting and reporting practices resulting from that orientation have given us the beneficial requirement of "full disclosure." It would be even more helpful if we could gain insight into the operations that produce these results. Let us see what takes place.

Businesses have at their disposal several necessary ingredients for survival and success:

1. A generally favorable political and economic environment.
2. A continuous stream of new or improved human talent.
3. A large, fluid money market that is always seeking ways and means to channel its funds.
4. An ample base of raw materials to draw upon.

Every business requires a portion of these ingredients. The business planner plots his future strategy by acquiring and developing these resources. He is not concerned with their values as embodied costs but with the use he can make of them. They are, to him, store-places of future services. The following quotation is pertinent:

> "Contrary to most popular notions, assets are in essence neither physical, legal, nor even financial phenomena. . . . The material or physical notion of an asset is denied by the fact that choses-in-action, leaseholds, franchises, air rights, and prepayments are all perfectly good assets. Redressable rights do not express the essential nature of assets, for legal title is not the determinate of asset existence. . . .

> Deferred charges for leasehold improvements, relocation of machinery, and extensive development campaigns involving research and advertising are certainly not evidenced by legal titles, though they may be perfectly good assets. . . . [As a result] assets are economic in nature; they are embodiments of future want satisfaction in the form of service potentials that may be transferred, exchanged or stored against future events."[7]

These "economic service potentials" are built up for release into the stream of operations. The usual way a major portion of these resources is initially acquired is by incurring obligations. We have, therefore, the following cycle: the acquisition of service potentials by means of obligations and the release of those service potentials into the stream of operations, which may or may not coincide with the liquidation of the related obligation. Thus, any obligation accorded balance sheet recognition is merely an indication that an asset (service potential) has been recognized at the same time. Some portion (but no specific portion) of the firm's total assets will be needed for discharge of the obligation.

In the first part of this paper, we were concerned with the question of when a liability should be recognized. But, as we have endeavored to develop, the pertinent issue rather is when the asset should be recognized, since liabilities in most instances are merely a consequence of asset determination and, at the same time, form restrictions against the free use of the enterprise assets as a whole. Conceptually, asset recognition should occur when an item possesses measurable economic service potential. The test of its existence should be, will the future results of operations be enhanced? Practically, it is not always possible to determine the precise moment when an asset comes into existence, as it is difficult to be sure whether any given apparent economic service potential will really be able to enhance future operations.

If we could solve by accounting techniques, the problems of ascertaining (1) a reasonable valuation for economic service potentials and (2) a suitable measurement of the flow of services from them, then the problem of what a liability is and when it should be recognized would be greatly simplified. We could escape from the legalistic concept of liability. In fact, it might not even be important to distinguish between "equities" and "liabilities"; both are restrictions of one kind or another against the use of firm assets. In the following quotation the philosophy of liabilities could easily be substituted for proprietary equities:

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[7] *The Fund Theory of Accounting and Its Implications for Financial Reports*, William J. Vatter, The University of Chicago Press, Chicago, 1946, p. 17.

". . . The principal objective that is aimed at in the classification of proprietary equities is to give expression to the various kinds of restrictions imposed upon the use of the assets, not to show their legal significance. Reserves for anticipated losses, for contingencies, for maintenance of working capital, or extension of plan are not 'legal' but restrictive appropriations of surplus. . . .

"The case is made even more stronger by the fact that there are some equities which defy classification as between 'proprietary' and 'liability' categories; e.g., reserves for self insurance, and other 'expense-equalization' reserves. In such cases the equities are not evidenced by any present or future redressable rights arising from contract, yet they are not unqualified proprietary claims in any but a monetary sense. The real significance of equities of this character is to be found in the restrictions they impose upon the asset . . ., not the quasi-legal or equitable consideration that may be involved."[8]

Operating Reserves As Liabilities

It is difficult to see how operating reserves could be treated as liabilities, if the economic-service-potential-recognition criterion is used. One does not envision any asset build-up, yet the objective of this type of reserve is to charge current operations in a manner similar to any other asset released into operations. A reserve for repairs, for example, is set up for major repairs. Actual repair expenditures to make good the total life of an asset tend to be heavy in some years and light in others. Therefore, it seems reasonable to provide for estimated repairs in order to reflect more fully yearly results of operations—since all years benefit from the expenditure. However, one might justify the recognition of such an "asset" and, consequently, a corresponding reserve, on the grounds that a present estimate of a future repair has *similar characteristics* with that of an economic service potential which is immediately consumed. (It might even be argued that the repair reserve should be a contra-asset, reducing the economic service potential.) Certainly the reserve constitutes a restriction on the free use of firm assets. Newlove and Garner believe that, "since the deferred repairs constitute a demand on the working capital of the concern, the Reserve for Repairs should be listed among the current liabilities."[9]

Product guarantee reserves present less of a problem. They arise out of the process of attempting to create an asset, albeit an intangible one, goodwill. In the account, "goodwill," one might set up a group of similar intangibles which

[8] Vatter, *op. cit.*, pp. 19 and 20.

[9] *Advanced Accounting*, George H. Newlove and S. Paul Garner, D. C. Heath & Co., Boston, 1951, Vol. I, p. 173.

possess the economic though not necessarily the legal properties of assets.[10] The economic service potential is in our good name, our reputation for customer satisfaction, our financial backing, etc. In setting up a reserve for product warranty, we create a related asset which, for lack of more specific title, falls under the goodwill heading. The obligation to perform arises out of this act; hence we recognize a liability.

With respect to the reserve for insurance, there is divided sentiment as to whether this should be merely an appropriation of retained earnings or some sort of liability or deferred credit. Carman Blough states emphatically that "*self-insurance* is no insurance and that losses . . . do not accrue in the sense of being accrued liabilities . . . Losses . . . do not accrue as do pension costs, or death benefit. The fact that a fire or an accident has not occurred this month or this year does not increase the probability that it will occur. . . ."[11] Both treatments represent restriction upon assets, but different analyses are appropriate for classifying these reserves. Newlove and Garner appear not to favor the recognition of reserves of the self-insurance type:

> ". . . If the accountant has determined that a certain charge is not of sufficient definiteness to warrant its being matched against the revenue of the period, his responsibility is concluded except for possible notation in a footnote or otherwise. . . . If the losses in question are not capable of being objectively determined, . . . the setting up of earned surplus appropriated reserves . . . accomplishes no worthwhile purpose."[12]

Moonitz, too, is dubious:

> ". . . The impression remains that most of the thought and analysis has gone into the determination of the debit, the charge to income, with the credit introduced as an afterthought. Some indication is also at hand of 'bootstrap lifting', that is to say, the practice of introducing expenses or other charges into the determination of income without first analyzing the situation to determine whether or not an asset has been used up, or a liability incurred. As a result, we see fairly frequently the spectacle of expenses paired off with credits to some element of proprietary interest."[13]

If one accepts the position of the authors quoted, any reserves of the indeterminate type (self-insurance or quasi-contingency reserves arising out of a

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[10] *The Economics of Accountancy*, John B. Canning, The Ronald Press Company, New York, 1929, pp. 42 and 43.

[11] "Accounting and Auditing Procedures," Carman Blough, *Journal of Accountancy*, April, 1959, p. 77.

[12] Newlove and Garner, *op. cit.*, p. 175.

[13] "The Changing Concept of Liabilities," Maurice Moonitz, *Journal of Accountancy*, May, 1960, p. 41.

charge to income) must be something other than an appropriation of proprietary interest (retained earnings). It follows, then, that they must reside somewhere in the liability section. But we have said that liabilities (obligations) arise out of acquisition or creation of economic service potentials (assets). In the provision for self-insurance, we have created no asset; hence we can find no justification for recognition of a liability. Similarly, an expense is the recognition of the outflow of services from an asset (which outflow may occur immediately upon acquisition or over a long period of time). In the case of a charge to income for insurance "losses" which may never occur, are we not (1) significantly distorting reported income for the period and (2) disclosing a liability which does not in fact exist?

Conclusion

There we have it. Most undisclosed liabilities are conditioned on the existence of undisclosed assets, some of which may have been consumed, leaving only a restriction against the free use of firm assets as a whole. The crux of our failure to disclose adequately the existence and significance of liabilities arises out of failure to recognize the source of liabilities, i.e., the obtaining or creation of assets (economic service potentials). In the absence of the build-up or creation of an asset, there is no ground for recognition of a liability. Similarly, where there is a build-up of an asset, there is also an associated obligation of some sort which should take form in the recognition of a liability.

The proper acknowledgment of liabilities, for statement purposes, does not lie in legal relationships but in the ability of accountants (1) to recognize economic service potentials and (2) to measure them.

Profits, Social Objectives and Accounting

by KENNETH W. PERRY*

MANY PEOPLE in the world today believe, or at least maintain, that the aims of society and attention of business to profit are somehow incompatible. Since the purpose of accounting is strongly oriented to efforts in the business enterprise to produce profits, the accountant is often drawn into this conflict. It is this writer's belief that this conflict is more literary than real.

Like any other institution, the modern business enterprise must first serve its own survival; this means it must operate at a profit. This law of its being, however, must be consonant with the aims of the society in which it exists. The modern business enterprise is set in a background of economic, social and ethical values and, in light of these values, the enterprise can derive an individual profit in the long run only to the extent that it performs an economic service that is socially useful. As a consequence, economic performance is the first duty of the business enterprise. In the discharge of this duty, its first objective must be to preserve intact the productive capacity of the resources entrusted to it. If it fails in this, it not only weakens its own power to survive but it also impoverishes the whole of society.

This is true because competition and the maximization of profits, which are of cardinal importance in the scheme of private enterprise, should operate to bring about lower prices, better products, and better services, all for the enhancement of living standards and for the promotion of the public good. The profit motive should be a constant incentive to invention, to the perfection of manufacturing and distributing processes, and to the elimination of economic waste. Maximization of profits involves a much broader horizon than the immediate dollar result. As Adam Smith put it in *Wealth of Nations:*

> "The natural efforts of every individual to better his own condition, when suffered to exert it with freedom and security, is so powerful a principle that it is alone, and without any assistance, not only capable of carrying on the society to wealth and prosperity, but of surmounting a hundred impertinent obstructions with which the folly of human laws too often incumbers its operations."

Only profitable businesses can provide jobs and opportunities for employees, earn a satisfactory return for investors and pay their share of the heavy costs of present-day government. As a consequence, the profit motive seems to be harmonious with both the methods and the desired goals of this type of economy. It is the present writer's belief that accountants can take pride in the role they play in the system; nevertheless, to take the system for granted and not to labor for its constant improvement, is perhaps to invite disaster.

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How to Handle Product Evaluation Procedure

by HENRY L. CLAYTON

ONE OF THE MOST DIFFICULT problems facing industry today is to encourage the development of new products and at the same time to develop and tailor a plan under which the uncertainties are measured in terms of the effect on the profits of a company. But how to select the promising products from the "duds"? This is always a moot question. The answer may vary for each business but the fundamental principles of selecting the product with high sales potential is the same. The proper selection can be developed only upon sound factual analysis of the product, combined with hard common sense thinking by members of a team. There are not enough available hours nor men to pursue the analysis of every potential new idea down to the last decimal point of estimated return on investment. However, a team organized along the lines suggested in this article would permit a qualitative, if rough, screening, so that the less promising ideas can be dropped before expenditures are made, and aid in the determination of priorities for those products that survive this screening.

The Preliminary Analysis Group

The preliminary analysis group is the "pilot" group on the team. It is its responsibility to screen all possible product items and to determine priorities for selected products that should be referred to the sales and engineering groups. Only those products that survive the preliminary analysis screening and show promise of becoming a profitable product to manufacture are forwarded to other groups. This allows the product engineering group to spend engineering talents only on products that survive the initial screening, and not to waste valuable time in designing and engineering products which should be stamped impractical from the start.

A point check system may be suggested for use by the preliminary analysis group in determining product priority, as follows:

1. *Stability factors.* How durable is the market? What difficulty is there in copying? How would the item hold up in a depression? How would it stand up in war time? How good is the patentability of the product?

HENRY L. CLAYTON, Elmira Chapter, 1960, is Plant Accountant of New Products Division, Corning Glass Works, Corning, N. Y. He has been associated with this company since 1950.

2. *Growth factors.* What unique properties would the material have to offer? What is the demand-supply ratio? What is the rate of technological change? What are the export possibilities?
3. *Marketability factors.* What is (a) the relation of this new product to the company's present markets, (b) the company's reputation in like fields, (c) the competitive situation for this product, (d) the effect of present customers? Is this an item of large volume per individual customer? An item requiring few variations or styles? A seasonal product? Does this product fit into the present distribution system or do new outlets have to be created for marketing it?
4. *Position factors.* Can this product be quickly commercialized or would it require a long development period? Can it be marketed

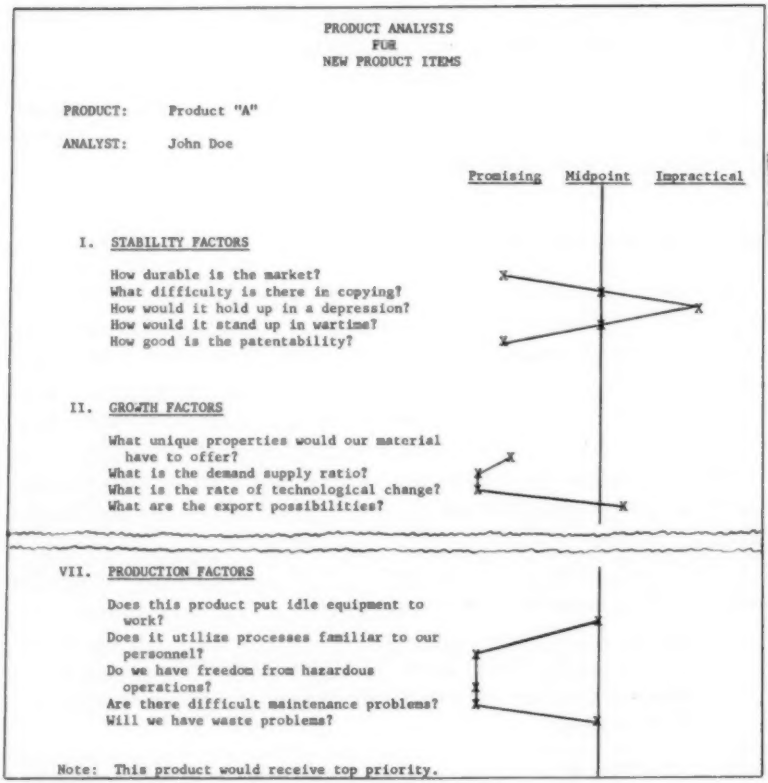
PRODUCT ANALYSIS
FOR
NEW PRODUCT ITEMS
PRODUCT: Product "A"
ANALYST: John Doe
Promising
Midpoint
Impractical
I. STABILITY FACTORS
How durable is the market?
What difficulty is there in copying?
How would it hold up in a depression?
How would it stand up in wartime?
How good is the patentability?
II. GROWTH FACTORS
What unique properties would our material have to offer?
What is the demand supply ratio?
What is the rate of technological change?
What are the export possibilities?
VII. PRODUCTION FACTORS
Does this product put idle equipment to work?
Does it utilize processes familiar to our personnel?
Do we have freedom from hazardous operations?
Are there difficult maintenance problems?
Will we have waste problems?
Note: This product would receive top priority.

EXHIBIT 1

as a complete item or is it one which merely provides one part of a multi-part product? Would this product assist the company in buying the necessary raw materials in quantities to improve its position in other purchases? Can the company supply or use its own raw materials?

5. *Research and development factors.* Does this product stem from knowledge the company possesses? Does it lead to knowledge it wants?
6. *Engineering factors.* Does the company have the know-how for this product? Does the item utilize standard equipment? Does the company have the engineering personnel available to work on the product?
7. *Production factors.* Does this product put idle equipment to work? Does it utilize processes familiar to our personnel? Is it a hazardous operation? Are there difficult maintenance or waste problems?

PROFITABILITY INDEX

NEW PRODUCT ITEMS

Product "A"

A.	% chances of Technical Success	80 %
B.	% chances of Commercial Success	100 %
C.	Sales Volume - Units/Year	500,000
D.	Sales Price/Unit	$36.00
E.	Manufacturing Cost/Unit	$18.00
F.	Static Market Life (1 to 3 yrs.)	3
G.	Research & Development Cost	$50,000
H.	Process & Product Engr. Dev. Cost	$100,000
I.	Market Development Cost	$30,000

Profitability Index: $\frac{A \times B \times C \times (D - E) \times F}{G + H + I} = 120.0$

Note: This product would receive top priority.

EXHIBIT 2

For each of these points a preliminary rating is assigned, as illustrated on Exhibit 1. Following this initial screening by the preliminary analysis group, those products receiving a favorable rating are immediately started through the process of calculating the profitability index (Exhibit 2), intended to establish a rough relationship between prospective gross profit and initial costs, giving consideration also to likelihood of engineering and marketing success with the item.

The Sales Group

The sales group now enters a quotation request to the engineering and estimating group for proper evaluation of the design and manufacturing costs of the product in question (Exhibit 3). It is the sales group's responsibility to establish volume, trade practices and discounts, and to find out what the competitive price is for the product or, approximately, what the customer feels he can afford.

QUOTATION REQUEST NO. 205

DIVISION _____ DATE _____
CUSTOMER _____ SALESMAN _____
ARTICLE _____ MAT'L. CODE _____
QUANTITIES _____ YEARLY REQUIREMENTS _____
COMPETITIVE PRICE _____

Description & Comments:

Detailed description of Product "A" including:

1. Customer's Specifications
2. Drawings of Product
3. Type of material requested
4. How used
5. If only a part of a multi-part product, include other component drawings

EXHIBIT 3

The Product Engineering Group

The product engineering group is the third and most important group in gathering and determination of the necessary data to aid the cost estimator and plant accountant in making realistic calculations of product profitability. The product engineer must keep in mind exactly what the production equipment and personnel can do. He must be sure, for instance, that tolerances he recommends for the product are not too tight or too loose, because in the production of new

products, tolerances are a vital factor in determining the profit or loss on the product. Choosing the right material for the particular product is also important. Is it necessary to use a premium material if a cheaper material will function as well? Establishment of the product specification should be in line with the company's production processes. The product engineer should steer clear of favoring a "super" product, when the average would suffice, that might prove unprofitable for the company. After the product engineer has designed and established specifications for the product, he forwards to the cost estimator all pertinent information necessary for processing of detailed costs.

The Cost Estimator

The cost estimator carefully examines the data received from the engineering group and maps out his schedule to determine what the ideal costs of production should be under the best conditions practically obtainable.

Material costs must be carefully analyzed to determine the quantity required for economical production runs as well as the volume in which they should be purchased. Frequently, the quantity purchased at one time will have a considerable effect on the purchase price. Other factors, such as utilization and waste, salvage value of waste or spoiled material, re-use of spoiled material and cost of reworking spoiled material, should be evaluated in determining the cost of material per unit of product. The labor cost per unit of product must also be determined, which involves the determination of the number of hours of each kind of labor that should be used to produce one unit of product and the rate per hour that should be paid for each kind of labor. The number of employees required to operate the department, especially if the product is one which requires a completely new setup, should be determined so that the plant accountant can prepare overhead rates.

The cost estimator points out the areas in which excess costs exist or potential cost reductions may be made. A constant alertness should be exercised over extraneous items which may enter into the cost picture, causing costs to rise. Shrinkage factors in the production process should be calculated reflecting optimism rather than pessimism.

After establishing of detailed costs to manufacture the product, the cost estimator again reviews his calculations to make sure costs elements are included. He lists the detail on the "cost data" form or worksheet (see Exhibit 4). On this form is shown the complete cost analysis and history of the particular product. The completed form should be concise and self explanatory, permitting the plant accountant to interpret it without other knowledge of the product, to the point of recommending a selling price.

Code Year

OPERATIONS AND STANDARDS

Title

Description	Lot Size	Unit Cost	Total Cost
Part Cost			

Labor

Operation	Labor Cost/Hour	% Select.	Hours per Pc.	Handled/ Packed	Hours	Total Direct Labor

Overhead Application

Direct Labor	Dept. Overhead	Sub-Total		Total Oh'd. & D.L.
			Accessories	
			Part	
			Std. Cost per Unit	Units
			Unit Std. Cost	

EXHIBIT 4

The Accounting Group

The product has now reached the stage at which the plant accountant determines what the total standard cost of a unit of product would be. This is done by adding together the ideal costs of each kind of material used in a unit of product, the standard unit cost of each kind of labor and the overhead costs in each unit for each department in which the product is processed (Exhibit 5). The costs so determined become the standard costs to be used by the manufacturing department to produce the item to predetermined specifications. These costs are used for comparisons with costs incurred and permit an analysis of the latter costs in order that trouble spots may be located.

The plant accountant must decide how tooling, mold costs, equipment and set-up costs will be amortized. Is the sales potential great enough to absorb all the special costs and still show a profit? Shrinkage factors must be examined to determine if the rates of production necessary to meet sales requirements are practical. Would the product call for a large production force for a short time and, if so, how are they to be utilized when the run is ended?

PRICING DATA

Customer_____ Proposal No._____

Item_____ Date_____

1. Direct Material:			
Purchased Parts			
Subcontracted Items			
Other			
2. Direct Engineering Labor: (Attach breakdown)			
Pre-prod. Hours / Prod. Hours / Other Hours			
3. Engineering Burden % of 2 _____			
4. Direct Manufacturing Labor: (Attach breakdown)			
5. Manufacturing Burden % of 4 _____			
6. Other Direct Costs:			
7.			
8.			
Sub-Totals			
Selling Expenses			
General and Administrative Expenses			
Sub-Totals			
Profit or Fee			
Royalties			
Contingencies			
Federal Manufacturers' or Retailers' Excise Tax			
Unit Selling Price or Total Contract price excluding special tooling			
Special Tooling Cost From Reverse Side of Form			
Unit Selling Price or Total Contract Price Including Special Tooling			

EXHIBIT 5

While it is the responsibility of the sales department to market the new product, sales management must rely upon the accountant for all of the facts necessary to advantageously price the product to assure the largest possible market and the maximum of profits to the company. To the extent that the accountant does his job well, his value to the sales department and, hence, to his company becomes more apparent.

Let Us Avail Ourselves of Advanced Formula Estimating Techniques

by RAYMOND B. JORDAN*

KEITH MARVIN'S article "An Approach to Cost Estimating by Formulas," published in the July 1960 issue of *N. A. A. Bulletin* is an excellent presentation of a most difficult subject. The author has successfully overcome the temptation to weave difficult mathematics into his subject and, therefore, his article should appeal to the majority of *N. A. A. Bulletin* readers. Thus Mr. Marvin's article may well become a standard reference for those interested in learning the fundamentals of formula estimating. The use of the technique offers the opportunity for cost accountants to rise above the average.

For those whose appetites become whetted by Mr. Marvin's article, advanced reading is recommended. They have been exposed to what might be classified as formulas of the first order in that single relationships are involved, such as cost versus weight, cost versus volume, etc. Cost formulas are not always that simple, however. Multiple relationships such as cost versus both weight and volume are sometimes involved, as, for example, in the estimating of advanced models of jet engines where cost becomes a function of weight, nozzle temperature, thrust in pounds, etc.

The following is recommended for readers who have mastered the initial technique:

1. Learn the value analysis technique. This will assist you in separating the product into its various functions. The *N. A. A. Bulletin* article "What a 'Value Analysis' Group Can Do to Achieve Cost Reduction," by Owen B. Hill, January 1959 issue, is a good basis for beginning.
2. Learn about computers. The theory of least squares and a desk calculator are sufficient tools for performing first order calculations as in Mr. Marvin's article. However, the advanced techniques, more often than not, require the use of a computer, such as the I. B. M. 704.
3. Learn about linear programming. An evening course in the mathematics or a course at an engineering division of a local college is encouraged. Dakota Ulrich Greenwald's volume *Linear Programming*, Ronald Press, 1957, makes good reading, but there is no substitute for classroom experience accompanied by the instructor's lecture.
4. Reading the following:
   a. *A Course in Multivariable Analysis* by M. G. Kendall, Sc.D., Blackwell's Booksellers, Broad Street, Oxford, England.
   b. *The Application of Factor Analysis to Large Scale Systems Test and Evaluation Program* by S. Robert Newman, Ground Systems Division, Hughes Aircraft Company.

Keith Marvin has implanted the germ of formula estimating in the minds of N. A. A. members. Here is hoping the "culture" continues to grow.

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Potential of Automatic Data Processing in the Federal Government

by JOSEPH A. VIGNALI

TEN YEARS of automatic data processing in the Federal Government have resulted in major achievements. The accomplishments of the last decade and the present highly promising plans provide the incentive to meet the tremendous challenge for unusual and exceptional achievement in automatic data processing.

Although this article deals specifically with Federal Government applications of automatic data processing, these experiences and promises of future achievements have their counterparts in industrial and commercial applications. Further, the possibilities of interchange of records between the Federal Government and private industry represents one of the more significant potentials in the use of A. D. P.

Unfortunately, there are many automatic data processing installations in which very little has been done to achieve the inherent capabilities of electronic equipment. Much remains to be accomplished in the use of automatic data processing if the truly great potentials of electronic computers are to be generally attained. Though the benefits to be derived are great and many, they will not be realized automatically or easily but only through careful planning and preparation, and a great deal of human effort, time and money. Above all there must be a sincere desire for improvement in the overall data processing systems of Federal agencies as well as a desire for more effective and efficient ways of performing data processing.

Technological changes have been occurring at a rapid and continuing pace. During this time computer speeds have advanced from milliseconds, or thousandths of a second, to nanoseconds, or billionths of a second. With development of these faster speeds, the amount of work that can be processed in a given period of time by the newer equipment has increased correspondingly. The need for wise use of equipment is imperative since waste or misuse of computer time has become so increasingly costly

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Note: Opinions expressed in this article do not necessarily reflect the thinking of the United States General Accounting Office.

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A. D. P. Growth in Federal Agencies

The development and use of electronic computers in scientific and mathematical applications in the 1940's gave rise to the electronic business management systems of the 1950's. The Bureau of the Census, assisted by the National Bureau of Standards, pioneered the use of large-scale electronic computing equipment for data processing applications in the Federal Government. The first large-scale automatic data processing system in the Federal Government was delivered to the Bureau of the Census in 1951. The Bureau presently utilizes seven computers in four different states for a variety of jobs, including special sample surveys of many types, the census of manufacturers and of retail and wholesale trade, and the compilation of foreign trade statistics.

The growth in the number of computers employed in the Federal Government has been rapid. Where 6 years ago there were some 8 electronic systems performing business-type data processing applications, today there are some 540 systems in operation, exclusive of computers used for tactical and classified purposes in the Department of Defense. During the past year the cost of operating these installations amounted to $295,000,000, mainly for salaries and rentals. It is estimated that by the end of the current fiscal year the number of computers will have increased to 646 at a yearly operating cost of about $344,831,000, with an additional capital outlay for the purchase of computers amounting to $14,661,000.

Many problems confronted those who took part in the early development of electronic systems. Some of the problems were met with imagination and skill; others were handled with waste and extravagance. Explanations may be found for some of the unfavorable results which haunted the pioneers in this field. But for those who followed the early users without benefiting from their experiences, little justification can be found.

Early Stress on Savings

Early users of automatic data processing equipment in the Federal Government placed strong emphasis on the economic benefits that were to be derived from electronic systems. The justification for the equipment on the basis of savings relied in a large measure on estimates of reduced personnel and equipment costs rather than reduced over-all operational costs. Conversion to automatic data processing seemed particularly attractive since the electronic systems could take over much of the work performed manually or by electrical accounting machines. It was believed that, by transition to an electronic system, significant savings of equipment rentals and personnel costs would automatically result.

The change to A. D. P. methods seemed to be the panacea for the steadily increasing data processing problems. Since it seemed to many that the quicker the conversion the sooner the expected savings would accrue, many applications were simply converted from manual or electrical accounting machine methods to automatic data processing systems with little or no attention to study and refinement of the methods of data processing.

In general, time has disclosed that "haste makes waste" in automatic data processing as it does in many other fields of human endeavor. The expectations of many of the early electronic equipment users who had approached A. D. P. mainly on the basis of dollar-and-cent savings of personnel and equipment rental costs were largely unfulfilled. High hopes faded when it became apparent that much of the publicized savings was a mirage. The unexpected upheavals that resulted in many instances from poorly planned and hasty conversions permitted very little savings, if any at all. Sometimes personnel and equipment costs were higher than they had been with the previous system. Generally, in those instances in which emphasis had been placed exclusively on limited economic benefit, the result was disillusionment. However, in fairness to the equipment in almost all cases the fault rested heavily on the human element, the individuals who had failed to guide and properly operate the equipment. Miscalculations were often the result of hurried and inadequate planning that gave emphasis neither to system improvements and revisions nor to accurate estimates of workloads and machine capacities.

Often a change in systems provided for expanded information and service to management which, in turn, required larger and more advanced A. D. P. equipment, thus necessitating costly equipment changes that could have been avoided by a comprehensive study prior to the installation. Changing from one piece of A. D. P. equipment to another requires moving-in and moving-out costs, interruption of operations during change-over, retraining, and reprogramming. Though change may often reflect progressive management, it represents waste and mismanagement when too rapid changes are required because proper planning does not precede selection of equipment.

A major lesson that should be learned from these early experiences is that a well planned and studied approach usually results in a smoother transition to A. D. P. which can more than make up for any delay that may occur while the change is being carefully studied. The approach based on getting the equipment in as fast as possible, with the hope that revisions will follow after the old system has been converted, overlooks several factors. It overlooks the fact that, once automatic data processing operations commence, there are day-to-day operating problems which take precedence over system improvements and often

virtually preclude consideration of any refinement of methods. There is also a natural inclination to stay with a system that has just been tested and is providing satisfactory information. Overlooked also are such factors as added costs that arise from the reprograming of system revisions as well as the retraining of people who have only lately become familiar with the electronic system.

It would be misleading to leave an impression that nothing good has come from some of these early installations. Where management took advantage of more timely reports, certainly some benefits were derived from faster processing. More accurate data processing resulted in those cases in which the input data to the system was accurate.

Also, it would be quite incorrect to leave an impression that no automatic data processing installation has succeeded on a purely economic basis. There have been instances in which expected savings have materialized. However, in these cases, the preparation for automatic data processing had been carefully planned and estimated savings had been based on exhaustive cost studies.

One such success which has been well publicized is the check reconciliation function of the Treasury Department. Through the use of an automatic data processing system and other mechanical data processing equipment, the Check Payment and Reconciliation Division of the Office of the Treasurer of the United States now performs centrally work previously carried on separately by the Treasurer's Office, the Federal Reserve banks, and the General Accounting Office. Since 1956, when the Treasury automatic data processing operations began, significant savings measurable in millions of dollars have resulted.

Current Stress on Better Management Information

The experiences of the last five years fortunately have had their effect on the limited dollar-and-cents approach to automatic data processing that places the entire justification on reduced costs of personnel and equipment. There is at present a better and wider understanding of the need for careful review and evaluation before converting to A. D. P. as well as of the real potential for better and more useful management data that can result from the proper use of electronic computers. Therefore, more attention is now being given in the preparatory stages of automatic data processing to effecting a more meaningful system designed to enable electronic equipment to provide management needs more fully with more useful information.

Based on this increasing experience, it should not be too surprising that some change in thinking would occur. There is a keener awareness of the more subtle and less measurable benefits that electronic data processing systems can

contribute to the effective operations of Federal agencies. Better management information cannot be measured simply by the amount of data or the speed at which it is obtained. More voluminous data and speed must be considered in conjunction with management's need for this data. Further, emphasis is frequently misplaced when the effort is solely for more data. It is far better to focus greater attention on less but more meaningful data for management use. Through the use of management-by-exception techniques, a manager is not bothered with situations which meet the prescribed standards. Thus electronic equipment, by performing comparisons and simple decisions, eliminates much of the drudgery that is normally part of the analysis process.

Automatic data processing equipment has a great deal more to offer than faster data or reduced data costs for data processed. New data can be offered to management which was not previously available, since it was too costly to obtain. While it would be extremely difficult to place a value on this new data or to measure its real effect on management, it could be of tremendous importance if properly developed to serve the management's needs.

Bigger "paper mills" frequently result when large-scale computers replace manual or punched-card systems without improvements or refinements. Because available equipment can more readily and easily turn out data faster, a temptation arises to prepare more and more reports with little regard to the need for the end products or for management's ability to make use of them.

Insufficient planning and preparation can also result in a waste of money, manpower, and time in other ways. Too early an acceptance of equipment can result in wasteful and lower utilization of equipment because programs are not sufficiently developed. Before accepting electronic equipment, some of the programs should be completely tested and ready for use so that, as soon as the equipment becomes operational, it may be better utilized. Delivery of automatic data processing equipment before any programs have been tested may result in rental payments on both the old and new equipment during the period of transition. While a certain amount of parallel operation may not be subject to criticism and may even be desirable, parallel operations for long periods of time are wasteful and can be curtailed with proper planning.

Real Potential of A. D. P. in Government

Although in many agencies electronic computers are used for numerous and varied types of applications, they still represent only a small part of the work to which this tool will eventually be put. The range of computer sizes now on the market can satisfactorily meet the needs of both large and small organizations. The development of rapid communication and data transmission

systems, together with the advances made in electronic equipment, has to a large extent invalidated the previous need for geographical decentralization of record-keeping to meet the immediate needs of local managers for timely information. Now, through the use of various communication systems, data can be transmitted card to card, tape to tape, or even computer to computer, so that a centrally located computer can receive and process data and return a finished report for the local manager's use on a very timely basis. A centralized data processing activity tied in to various subsidiary data generating locations can lead to savings of money and manpower by eliminating many of the duplications of record-keeping that frequently exist at local levels. At the same time, the centralized automatic data processing system can provide local managers with the timely and effective information required.

Because of their tremendous speeds, electronic computers lend themselves well to the centralization and integration of data processing functions of many of the larger Federal agencies. While some of the agencies have achieved improvements in their automatic data processing systems by centralizing data processing, still greater effort in this area is needed. To effect substantial improvement in this area requires an approach in which all functions of various subdivisions are viewed as in interrelated whole. The emphasis should be placed on management objectives and informational requirements. Planning for an integrated system includes comprehensive systems analysis, requiring ample resources in men and time. Recognition must be given to the difficulties and time required in progressing from the preliminary phases of an A. D. P. study to the systems design which includes organizational changes. Top-level support is required at every stage of the development.

Due to the mounting volume[1] and the complexity of paper work and record-keeping plus the direct relationship of Government to commercial industry account keeping and data processing operations, there is a great need for coordinated effort to simplify the task of both. There are several fields of Government activity where large volumes of transactions flow between Government and industry. Among these are procurement, tax and wage record reporting, and statistical reporting programs. There is a need to take greater advantage of opportunities for automatic processing of data for transcription between these systems.

Toward Inter-Agency and Government-Business Data Exchanges

Coordinated effort among Federal agencies in the field of data processing

[1] According to the second Hoover Commission paper work management report, over 25 billion individual pieces of paper work are created and processed in Government operations annually.

provides one of the greatest potentials that automatic data processing has to offer. It permits the work performed as a necessary end product of one agency to be utilized as input for further processing by another agency without further preparation. While plans in this area are still largely in the formative stages, more fully integrated data processing activities of related Government agencies nonetheless provide a great challenge and a promise that A. D. P. will serve well the needs of the Federal Government.

The Veterans Administration has recently installed a large-scale computer at Hines, Illinois, which is to become the center for the data processing activities of the Department of Veterans Benefits. Its first application will be the payment and statistical operation of the disability and death benefit programs. Whereas, at present, regional offices maintain several types of records for each payee, a magnetic tape master file of all the 4,700,000 veterans and beneficiaries who receive monthly checks for compensation or pension, or death insurance awards, will be established and kept up to date at the Veterans Administration data processing center.

A payment tape, produced by the computer, will be forwarded to the Treasury Department which will use this tape on its own equipment to write the checks issued to veterans and their beneficiaries. In addition, a geographical code will be included on the tape so that, when the checks are prepared and forwarded to the post office by the Treasury Department, they will have been already sorted by States and larger cities. Thus it is hoped that, without maintaining multiple records, this system will process the paying of benefits to veterans or their dependents from the time applications are received in the Veterans Administration to the time the checks are delivered by the Post Office Department.

Another area of possible integration which is now receiving increased attention is the interchange of records between the Federal Government and private industry. Each year millions of transactions flow between industry and the Federal Government. More and more of these transactions are being recorded in machine-processable form by industry for its own use. Automatic transcription and subsequent automatic processing of these transactions for Government purposes are possible through the use of the data in this form. Arrangements have been made for exchange of data on magnetic tape between the Department of Defense and some private firms. However, only limited interchange of data in this manner has taken place to date. For example, wage records are reported on magnetic tapes to the Bureau of Old-Age and Survivors Insurance by only a small number of companies.

Still another way to use automatic data processing is through the establishment of computer centers for agencies that have data processing problems that would

not warrant the use of a computer on a full-time basis. Under this type of arrangement, each of several agencies would bear its proportionate share of the costs of operating an A. D. P. installation and thus each agency could take advantage of automatic data processing in an economical fashion. Some installations that have computer time in excess of their needs now make time available to other agencies on a reimbursable basis. This result, however, has come from excess machine time rather than from a plan for coordinated effort among agencies. The establishment of service centers should be on a planned basis and the direct result of a coordinated plan designed at the outset to serve the needs of a number of Federal agencies.

Where properly used, electronic systems are causing evolutionary changes in management control methods through development of management-by-exception techniques and through the consolidation of related data in integrated management analysis reports. These changes are discernable in the various stages of systems development presently under way, particularly in the supply and logistics systems of the Government where the broadest experience has been gained in the management uses of these new electronic systems. Most of the present application efforts are limited in that they involve the design of systems to solve specific data processing tasks for various segments of the over-all supply management programs, rather than the development of integrated systems to meet the management needs of the total functional area. However, in many cases, plans are being made looking toward the future integration of closely related procedures into consolidated processing and reporting systems. Since the initial applications of automatic data processing to the inventory control operations of supply and logistics programs, there has been a gradual expansion of electronic systems into almost every functional area in the supply complex, i.e., program planning, budgeting, accounting, reporting, and other related areas. If the full potential of automatic data processing is to be reaped, much greater effort must be exerted to accomplish this sort of integration, not only in the supply area but in other areas of business applications.

One need but consider that in some supply systems in the Government there are many billions of dollars carried in inventories, to realize that improvement in supply information, which would permit even a small percentage reduction in inventory levels, could result in substantial savings. The possibilities in the Federal supply area are really staggering.

Some Examples of the Forward Look

Today in the Federal Government there are trends of development toward

integration which, when properly controlled and exploited, will play a lasting and significant part toward the realization of major improvements. Present plans of some of the Federal agencies for comprehensive and fully integrated automatic data processing operations are exceedingly ambitious and extend far into the future.

This forward look is exemplified by the Internal Revenue Service which has an automatic data processing plan involving a staggering workload of approximately 95 million tax returns. This number does not include related pieces of paper, such as information returns. The Internal Revenue Service estimates that by 1975 the number of tax returns could amount to 125 million. In an attempt to effectively process this increasing workload, the Internal Revenue Service is planning to establish a complete automatic data processing system which will in time integrate work presently being performed in the district offices and service centers. These automatic data processing plans include not only procedural changes but also organizational changes.

It should be possible with such an automatic data processing system to utilize data more effectively by coordinating all the information documents available to Internal Revenue Service, such as corporation reports on wages paid. Such a system should permit the checking of data contained in the various types of information returns to the information reported on tax returns. The Internal Revenue Service would maintain a single debit or credit balance for each taxpayer for all types of tax liabilities, such as income, excise, and withholding, and would present a net bill or refund. The Internal Revenue Service hopes to start the first automatic data processing service on a pilot basis soon. The Service has planned a vast and complex program which, it is expected, will take from 8 to 10 years to complete.

The Veterans Administration also has extensive plans for computer applications in its life insurance operations which will pull together the premium, loan, dividend, and billing records into one major file. The Veterans Administration is presently transferring to magnetic tapes all the insurance records required to service more than 6 million policyholders. Master records have been designed to contain such data as policy number, date of issue, kind of insurance, premium rate, and name, age, and address of each policyholder.

From Planning and Study to More and Better Information

Although cost reduction of data processing should be a goal of any projected A. D. P. installation, it should not necessarily be the only or dominant objective. The danger of such an approach is that often an agency is so sat-

isfied that it can save some money through lowered equipment and personnel costs that it makes no effort to achieve other and more important objectives of automatic data processing.

Of greater value, and a truer measure of automatic data processing success, is its effectiveness to help management in the fulfillment of responsibilities. Electronic systems present the means to improve management analysis and techniques. They offer an opportunity to managers of many kinds of activities to weigh the results of their decisions and those of their subordinates. However, to accomplish this, it is necessary to develop methods to use more fully the electronic systems' ability to develop analytical reports that result from automatic summarization, automatic generation of data relationship, and automatic generation of trends, rates of flow, rates of change, and the like.

Electronic computers can provide information more quickly and more accurately. Timely and accurate data can result in better and faster management action. Cost information that quickly and accurately points to wasteful practices or supply information that speedily indicates too high or too low inventory levels, can help management make decisions that result in significant economies.

In general, the need for comprehensive study and thorough systems planning before conversion to automatic data processing has been firmly demonstrated. The primary objective of systems analysis and design is to effect improvements by providing more valuable information to management and reducing over-all operating costs. Accordingly, in the Government, systems analysis and design should develop data processing that will efficiently meet the operational needs of an agency. Planning for data processing is an important step in determining the best methods to accomplish an agency's responsibilities and workloads.

The vast automatic data processing experience accumulated during the rapid growth of A. D. P. has led to changes in philosophy concerning this valuable tool of management. A more widely accepted approach based on planning and study would result in more accurate estimates of work requirements and a better understanding of machine capabilities. Expectations of benefits to be derived from automatic data processing would be realistic and more easily attained. A sounder basis for selection of equipment would lead to the obtaining of equipment best suited to perform the mission of the specific agency for a longer period of time. If better planning diminishes the need for rapid change from one piece of automatic data processing equipment to other more advanced equipment, the time and money spent in the planning will have been well worth while.

Product Cost Brought into Focus by Comparative Analysis

by WILLIAM F. KIESER

OUR COMPANY produces a large variety of earth-moving machinery powered by Diesel engines. Most of these products contain thousands of individual piece parts, large and small, some manufactured in our shops and others purchased in various states of completion. Standard cost records are maintained on over 100,000 items. It becomes readily apparent that cost inequities which may occur, can defy detection under the best of procedures, so that a most thorough analysis of basic factors is mandatory; no feature of comparison can be overlooked, however insignificant it may appear. The word, inequity, used throughout this article, carries a connotation of unfairness, and is used to designate those irregularities and inconsistencies in cost which bear down unnecessarily upon the profitability of operations, otherwise achievable.

The cost analyst must have an alert, inquisitive mind and the persistence to trace cost differences to their very source. Above all, he must develop an unbiased sense of values and acquaint himself with all the mechanics or methods involved in purchasing or manufacturing of the product concerned. Nothing can be presumed to be correct or justified, nor can the best solution be considered found until all the basic facts have been gathered and thoroughly reviewed. Results are often beyond expectation, as a dime saved in a high-volume piece part can quickly grow into tens of thousands of dollars per year.

The required analysis must be given adequate attention. The accounting department of each of our producing plants is charged with the responsibility of maintaining careful watch over its own manufacturing costs and appropriately reporting factual cost information. However, the latter portion of its function includes effective disclosure of product cost inequities or apparent inconsistencies in product design, material or fabrication processes. Since design engineers, purchasing men, metallurgists and fabrication planners generally are not experienced accountants, it is increasingly regarded as the functional responsibility of the cost accountant to properly disclose not only periodic cost fluctuations but also cost inequities or inconsistencies, wherever they may exist. The present trend in business, with ever increasing competition entering into practically all fields of enterprise, makes it necessary that cost accountants enlarge their perspective

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and assume the responsibility of properly presenting relevant conditions beyond general comprehension. If such an approach is carried out in a constructive and diplomatic manner, the results can be most rewarding, effecting worthwhile product cost reduction.

General Procedure

Following is a brief discussion of comparative cost analysis as practiced in our company. Comparative cost analysis work is performed primarily on high-volume output, being sure to include inventory items of importance in terms of cost value by individual part. The items reflecting the largest investment in inventory, are readily identified since usually 75 percent of production inventory value is contained in only 15 percent of the items comprising the typical production inventory. Needless to say, those inventory items containing the greatest investment receive primary attention in the comparative cost analysis work.

Upon selection of a high-volume item for investigation, the basic data is first compiled and statistically arranged for comparative analysis. Latest actual material cost only is used, together with latest operational standards prevailing in the shops. At one Illinois plant, Diesel engines are produced, among others, in six basic sizes for powering of prime products. Using the piston as an illustration of comparative cost analysis, the basic data, by product, to be collected first comprises the following:

Sales Designation

Engineering model
Piston identity
Engine horsepower
No. of cylinders
Cylinder bore
Cylinder stroke
Revolution p.m.
Height of piston
Outside diameter
Unit weight—rough
Unit weight—finished
Metal specifications
No. of oil ring grooves
No. of compr. ring grooves
Crown indentations

Annual requirements
Scheduled lot sizes
Actual lot sizes

Material cost—
Casting identity
Source of supply
Supplier's location
Contract quantity
Lot size shipments
F.o.b. point

Casting cost, each
Freight inbound
Pattern cost allocation
Set-up cost allocation
Unit material cost
Cost per pound-rough

Sales Designation (cont'd)

Machining cost—
- Machining area (per square inch)
- No. of operations
- Scheduled lot sizes
- Actual lot size
- Total set-up hours
- Unit set-up hours
- Unit machining hours
- Total unit labor hours

Average hourly labor rate
Plant burden allocation
Total labor & burden rate

Total machining cost
Cost per pound—finished
Cost per square inch area

Metal removed in weight

Machining performance rating
Machining rejection percent
Spoilage loss percent

Total product cost, each
- Unit material cost
- Unit machining cost
- Unit total cost
- No. used per engine
- Total cost per engine

Engine horsepower
Cost per horsepower

Comparability relation
Comparability variance

When all of the basic information is conscientiously procured, systematic comparative analysis can begin. Depending upon nature of item being analyzed, this information may be curtailed or further expanded as deemed advisable. The cost analysis generally comprises the following principal aspects.

Purpose or Function of Comparison

The first duty of the analyst is to acquaint himself thoroughly with the item under consideration. What is its purpose or function and why is it designed in its particular fashion or application? If the cost analyst is unfamiliar with the item, he should visit the production center where it is stored or produced and observe in detail all production methods or processes involved. Seeing is better than theorizing and factual knowledge is not always gained by clinging to office chairs.

Design or Product Comparison

Next in line is the duty of making comparative analysis of design, its specifications and requirements from the engineering standpoint. If marked variations appear in design or application, the item's basic justification should be determined. An open mind must be maintained as accountants are not engineers and must recognize design problems as beyond an accountant's skill. If, however, something does not sound right or appears out of line under comparative analysis, the accountant should question product design differences or inequities until a satisfactory reason becomes evident. Engineers are quite receptive to product cost inquiries and, when not, the accountant should carefully calculate the dollar

value of the difference or design inequity per unit, multiply the result by the annual usage and then challenge engineering management for substantiation of the questionable aspect. Usually the annual cost difference becomes large enough in dollar effect to command appropriate attention and action by engineers.

Past results of comparative design analysis have proved rewarding in their relation to product cost. The questions very effectively placed before engineers are (a) is the added cost justified from the design standpoint and (b) what is it worth to the customer. Some of the results following these questions have been improvements of design, realistic specifications of corners or surfaces, etc. Comparison of blueprint details may disclose variations in material specifications, machining dimensions and tolerances, methods of fastening together, etc., which may not have been questioned before by manufacturing people because they were originally specified by the engineers. Product design comparison is, therefore, the first line of attack in constructive product cost analysis.

Material Cost Comparison

Material cost comparison may generally be divided into three major aspects, namely:

a. Unformed rough material.
b. Pre-formed rough material.
c. Purchased finished material.

Unformed rough material generally comprises bar, plate and sheet metal stock which can be procured directly from steel mills in large quantities or from warehouses in lesser quantities. There are many extra costs applicable to basic steel cost in a multitude of chemistry combinations such as particular alloys, hot or cold finish, pickling, oiling, sizing, etc., which provide for an intensive study as to the particular application of metal combinations, the most efficient yield from bar or sheet sizes in manufacturing and, finally, the lowest cost of unformed material obtainable by volume f.o.b. plant.

Pre-formed rough material generally comprises castings, forgings and stampings which usually require added capital investment in pattern equipment, dies or special tooling. In conducting comparative cost analysis, these capital investments must be properly prorated over their expected service lives which should recognize factual early obsolescence rather than conventional amortization. Source of supply, delivery location, purchasing quantities and material specifications must be carefully compared for any inequities caused by the supplier. Where questionable cost inequities are difficult to solve, it may be desirable to talk with the suppliers in regard to their cost and price determination methods. Under

our increasingly competitive economy it can be questioned whether a supplier's net operating profit should exceed that of the purchaser.

Purchased finished material generally comprises those items on which no further direct labor needs to be performed. The same comparative analysis procedure applies as previously outlined, except that the field of variety of items broadens considerably. If they are classified as to volume importance, even small parts, such as hardware, can become subject to intensive cost comparison by which impressive cost reductions may be obtained. Also such finished items as springs, roller bearings, electrical parts, and a host of others, provide unlimited potentials for comparative analysis, if only the analyst puts constructive imagination to work. When all basic factors are collected and are intelligently arranged, the detection of product cost inequities becomes simply a matter of common sense reasoning along with an indefatigable persistence to carry the action through.

Another major aspect of comparative material cost analysis is the review of suppliers, their facilities, locations and methods of doing business. Again, accountants are not purchasing agents and, therefore, have to make allowances for procurement conditions. The practice of engineers of designating certain brands, makes or suppliers directly on blueprints or drawings should be discouraged as it limits the purchasing agents in discovering and utilizing other, more favorable sources of supply. Where decisive material cost inequities exist, the buyer should be fortified with all the comparative data to enable him to effectively convince the supplier of cost excesses and, if the attempt proves futile, seek new sources of supply.

Fabrication Cost Comparison

Fabrication operations generally include five major classifications: (1) machining operations, (2) structural steel fabrication, (3) welding and brazing, (4) heat treating and induction hardening and (5) assembly, test and painting. Each of the foregoing functions is controlled by master production work orders issued by the respective planning departments. Each particular work order shows standard time applicable by operation, per man and per machine. The latter is necessary to reflect multiple facility usage under which one man may operate two or more machines simultaneously or vice versa. Also indicated are the particular types of facilities on which each function is to be performed, although the shop foreman has the prerogative to use his machinery as best he knows how. Having this basic data available on master production work orders, the alert cost accountant can readily proceed with comparative analysis of fabrication processes as follows.

Direct labor. Compare operators' time standards by respective functions and in total. Determine whether time standards reflect estimated, averaged or time-studied factors, also whether single-function, progressive or multiple application. A major contributing factor to direct labor cost inequities is often found in time standards as established and in the proration of set-up time. While accountants may not be skilled in evaluating operational time standards, decisive differences of questionable character should be challenged. Pieces produced per hour are still best as comparative measurement.

Facility usage. Compare facility application by respective functions with cost per standard hour of facility operation. Analyze tooling utilization, idle time, shop routing and multiple set-ups. Drastic variations in the hourly operating cost of larger facilites can seriously influence the individual piece part cost. Another major factor contributing to fabrication cost inequities is variation in methods of operational routing and utilization of production facilities. The factory layouts of planning experts do not always reflect lowest possible cost. Again, accountants should normally not question facility application and routing through the shops but, when costs seem unreasonable, substantiation by planning supervision should be obtained.

Performance output. Compare work output measurements to determine either low or extremely high output performance percentages to standard production (100%). Decisive fluctuations readily indicate cost inequities which may reflect either low or too liberal time standards.

Spoilage and salvage. Compare periodic spoilage ratios and re-machining frequency to determine abnormal conditions. If these are erratic, disregard them, but if constant or uncontrollable, then definitely consider their reflection in product cost of the item affected.

Machinery replacement. Investigate age or acquisition date of facilities used to produce output covered by comparative analysis. The production yield of an over-age facility warrants special review to challenge its service life usefulness. Too often such facilities no longer even pay their so-called room and board, and new inventions may do the same work in half the time. Production lost through retention of antiquated machinery is often a hidden cost of sizable magnitude.

Using the Results

In summarizing comparative cost analysis work for exposing potential reduction of product costs, the prime necessity is a most thorough search for any kind of cost inequity. It requires relentless effort, an open mind, and diplomatic

contacts with all the departments involved. Results are not always evident in immediate monetary cost reduction and more often become effective in future product designs. Most beneficial is the establishment of a product cost review committee to discuss cost inequities without bias. The committee should meet regularly and consist of representatives from engineering, purchasing, manufacturing, metallurgical, merchandising and accounting departments. In these meetings high volume product costs are first outlined in detail, then any apparent inequities are pin-pointed and thoroughly discussed. Where possible, actual samples of items being analyzed are presented at these meetings in varying stages of production; otherwise, blueprints or photographs are provided. A factual report of the proceedings is prepared and submitted to all concerned for further action. Where results of discussion are far-reaching, follow-up meetings are scheduled.

In this age of fast-moving changes and steadily diminishing return per dollar of business investment, the cost accountant is in an enviable position to contribute much to the end-result, net profit, by diligently searching out cost inequities and exposing them effectively.

Solace for the U. S. Taxpayer?

by CHARLES LAWRENCE*

AMERICAN TAXPAYERS, who are wont to groan when faced with the unhappy duty of completing their tax returns and remitting what seem to be burdensome amounts, may find some solace in a glimpse of tax administration elsewhere. While I was recently in one South American country, some interesting aspects of its tax administration came to my notice.

The tax law is naturally expressed in native language, and many subtle idioms may not be properly understood by the average overseas controller. But this is by no means the entire difficulty. Consider the penalty for not filing a corporate return. In such cases the tax authorities assess a tax on the corporation, based on a presumed profit. This profit may be computed in one of two manners: (a)

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as 30 percent of the value of the assets (as rather circumspectly defined) or (b) as a percentage (15 to 50 percent at the discretion of the taxing authority) of the gross receipts of the company as substantiated from any records the authority may use, such as sales tax returns, etc.

Then there is the matter of contact with tax personnel. Conceding properly kept books, the company can expect a visit from the tax inspector, sooner or later. Conduct toward this official is predetermined, for the law clearly indicates that any disrespect will result in that official calling on the local police authorities for help. Documented instances of disrespect subject the company and persons involved to punishment under the penal code. Documentation means a statement by the offended official, together with such other evidence as he may care to gather. This official is granted "exclusive control" over: (1) the proof of all tax transactions, (2) the "withholding taxes" and (3) collection and investigation of tax information about the company from any source.

In cases of failure to observe the tax law, a schedule of fines (aside from civil suits) has been established. In case a taxpayer owes no tax but files his return late, a small fine is assessed. If he files late and has a tax payable, a fine of one percent a month is added.

"If the source of tax or the attorney of the taxpayer is domiciled abroad," i.e., subsidiaries of foreign companies, the taxing authority may demand additional tax because of "lack or inexactitude" of the source document. There is a 30 percent fine if at least the questioned amount of revenue is admitted. If the demand is unheeded, if the explanations are unsatisfactory, or if the company fails to admit all the questioned taxable revenue, a fine of 50 percent is added. Finally, a fine of 300 percent is added when there is an obvious intent to defraud.

Perhaps the most precious jewel in this whole tax administration process is the provision in the law which puts incentive into the collection system. This part of the law provides that only 50 percent of all of the fines go directly to the government; the remainder is split up among the members of the taxing department: 10 percent goes to the official who denounces the company, 10 percent to the tax investigator who substantiates the charge and 30 percent to the porters and messengers in the tax department. Fortunately, the law excludes from participation either as a denouncer or as an investigator, those who formerly worked for the errant business firm!

On the brighter side, it is possible to get a discount for paying taxes before March of the year in which they are due! However, all in all the present system in the United States may well take on substantial merit when compared to these alternatives.

Supervisory Control of Clerical Assignments

by W. GERALD COLE

THIS PAPER describes a technique which has been in use for several years and has proved to be effective. It is designed to provide the following with a minimum of effort:

1. Reminder of assignments (by job and by due date).
2. Record of performance.
3. Schedule of assignments,
   a. By job,
   b. By section, group or individuals,
   c. By clerical function (type of work).
4. Record of hours worked.
5. Means for determining clerical efficiency for routine assignable work.
6. A simple method for calculating clerical job costs.

Information on hours worked, clerical efficiency and clerical job costs is particularly needed, and administrators should have it but so very seldom do. When a supervisor has some idea of the extent of the hours and costs, he is in a good position to administer and control his work, and has a basis on which to raise questions with management as to whether or not particular portions of the paperwork are worth its cost. The counsel offered by this article is addressed to the supervisor personally, as the frequent use of the second person pronoun will evidence.

Inventory of Assignments

The first step in establishing the system is to take an inventory of the work assignments which have been delegated to you. If you happen to have a list of all the reports, vouchers, etc., which must be prepared, together with the complete schedule for them, the task will be eased considerably. If not, start from scratch by preparing a list of work for which you are responsible, with the respective due dates, for each calendar month. In preparing the list, attempt to show only a description of the final result of the work, restricted to one line, and the date such work is due. Show only enough description to properly identify the job to the people you supervise.

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A very simple form can be used throughout most of the system. The type of duplicating or copying equipment available will govern to some extent how the sheets are set up. Exhibit 1 is an illustration of a partly filled-in form (actual size is 8½" x 14") set up on a direct image offset paper matrix. Lines drawn and data subsequently typed on it are reproducible. Copies are then duplicated and, in addition, several reproducible matrices are also run off at the same time. These copies and matrices will be used in subsequent steps of the procedure.

Work Schedule
January

Sheet of

Due Date	Work Class & Job (Non-recurring)
	Work Class "A":
3	(a) Job 1
4	(b) " 2
7	(c) " 3
7	(d) " 4
9	(e) " 5

EXHIBIT 1

Reminder of Assignments

In detailing the work, prepare a separate list for recurring monthly tasks (since 12 copies of the list will cover the entire year) and a separate list for recurring quarterly work (4 copies for the year). That leaves only the non-recurring monthly work to be shown on individual monthly lists. Exhibit 1 shows an example with dummy entries on a non-recurring work monthly list. Exhibit 2 is an example for recurring monthly work. A similar sheet would be prepared for quarterly work. The entries shown on the exhibits are coded solely for this presentation; in practice, actual work classification (by subjects) and job titles or descriptions are used. (Disregard for the moment the matter in the upper right corner of the exhibit—it will be explained later.) It will help in later steps of the procedures to classify the jobs by major work functions and to list the work under each class in chronological order by due date.

On Exhibit 2 you will note the work class, "general routine". This is work done from week-to-week or even day-to-day that is assignable to your personnel. It may be work to be done in odd moments during the month but which recurs every month or it may be work that must be completed every day or every week; in any event, a certain number of assignable hours can be allocated to it each month.

Work Schedule
January

Sheet of

Due Date	Work Class & Job (Monthly)
	Work Class "X":
10	(a) Job 100
12	(b) " 101
15	(c) " 102
	General Routine:
Var.	(a) Work Class "P" Job 300
"	(b) " " "Q" " 240
"	(c) " " "A" " 3
"	(d) " " "B" " 12

EXHIBIT 2

When the work lists are prepared, the first step is completed, since they provide a reminder of work assignments by job, and the respective due date for each job. An additional advantage will be gained if, during preparation of the work inventory, the column on the left of the form is used to fill in the number of reports which have to be prepared for the respective jobs as well as the number of pages in each report. The purpose of this data will be explained later.

Record of Performance

One set of each of the assignment reminder sheets can be used by you to record the performance of your unit. By entering calendar years in the right-hand column headings of both non-recurring and recurring work lists (monthly and quarterly), you can develop a historical record for several years' performance to compare with the due date appearing in the column to the left of the description. Exhibit 3 is an example of such a record. This information can be used for work scheduling, to establish more realistic due dates, etc. You will find it to be a valuable tool for administrative purposes. Most important, it is informative as to how you are performing at the present time as it indicates whether you are meeting the schedule or falling behind.

On Exhibit 3, you will note that Jobs 10 and 11, under Work Class B, were two days overdue in 1960. The reason is shown as a footnote on the work schedule at the bottom of the form. This information can be used next year to remind the persons responsible for furnishing the data to you that you have to receive the information by a certain date in order to have sufficient time to

complete your own portion of the work. In cases in which you consistently run ahead of the due dates, it should be possible to change the requirement date to a later one—but one which will not prevent you from completing your own work in time.

Most accounting operations must be run on a very tight schedule; this schedule must be adhered to, so that information will be available when it is needed. A record of past practice, measured against due dates, can be quite helpful as an ideal medium for control of operations. It shows what has to be done, when it is due and when it was accomplished.

Work Schedule
January Performance

Sheet 1 of 5

Due Date	Work Class & Job (Non-recurring)	1959	1960
	Work Class "A":		
3	(a) Job 1	3	3
4	(b) " 2	5	4
7	(c) " 3	7	6
7	(d) " 4	8	8
9	(e) " 5	9	9
	Work Class "B":		
2	(a) Job 10	2	4 (1)
5	(b) " 11	5	7 (1)
8	(c) " 12	8	9

Note - (1) "Feeder" data received 2 days late.

EXHIBIT 3

Schedule of Assignments

Additional copies of a set of the assignment reminder sheets (or copies made from the reproducible matrices previously mentioned) can be used to provide a record of work assigned to various sections, groups or individuals. For this record a set of assignment sheets is used for each year. By filling in section names in the right-hand column headings and checking applicable job blocks, you can assign the various jobs to the section heads. Each section head, therefore, has a record of what is expected of his unit. He (or the supervisor in small units) can use a similar set of sheets to schedule the work within his unit by inserting the names of group leaders (or individuals) in the headings of the right-hand columns. It is then possible to assign the type of work each unit or individual should perform.

One method of assigning or scheduling work is to insert code letters in the job block under the respective individual's name. The following examples

of such coding are quite general in nature but can be used for most clerical work:

P — Prepared, V — Verify and control,
A — Assist to prepare, C — Proof check and proof read,
R — Reproduction control and ruling (reports).

The code letters should be inserted in the left portion of the appropriate job block, to leave space to insert hours needed for the job performance.

When the work is scheduled by the section head, copies of the assignment record can be furnished to each group leader or individual as a record of work assigned. Estimated hours to complete the work can be entered in the center portion of each block, if this is deemed worthwhile as a help in scheduling the work. Exhibit 4 is a schedule of assignments by job, by section or individual and by clerical function. Copies of such data furnished to each individual or unit serve as notice of what is expected and when it should be completed.

P - Prepare
A - Assist to prepare

Work Schedule
January Assignment

V - Verify & control
C - Proof check & read
R - Rule & repro. control

Sheet 1 of 5

Due Date	Work Class & Job (Non-recurring)	J. J. Jones	A. B. Doe	R. C. Roe	Group A
	Work Class "A":				
3	(a) Job 1	V	P	A	
4	(b) " 2			P	
7	(c) " 3	PV		R	C
7	(d) " 4	P	A	A	
9	(e) " 5	V	P	R	C

EXHIBIT 4

Record of Hours Worked

Copies of the filled-in work assignment sheets furnished to each individual, unit or group leader, will also serve as worksheets for recording the actual hours spent in performing the work. Each individual should be responsible for entering his own time. Overtime hours worked should be circled when they are posted to the record to indicate that they should be costed at premium rates.

Usually it is possible to assign jobs broad enough in scope so that fractional parts of an hour can be handled conveniently. If fractional hours are required, do not break down the time period to less than 15-minute increments, and post it to the record in decimal hours (.25, .50, .75). Such a time approximation should be sufficiently adequate and will greatly simplify summarizing the data.

Man-hours entered might be handled in the following manner:

1. Estimated hours—entered by the section head before doing the work.
2. Actual hours—entered by the individual after doing the work.
3. Estimated and actual—entered by section head and individual to record both estimated and actual time.

At each month end, the record of hours can be summarized by jobs. Exhibit 5 shows this completed record. The total job hours for each class of work should also be obtained. Such totals are placed on the respective "work class" lines. After the hours are summarized by jobs and work class, the supervisor should obtain the total of the hours for the month required for: (1) non-recurring work, (2) recurring monthly work, (3) recurring quarterly work (where applicable) and (4) total of the assignable hours for the month. The assignable hours can be posted at the bottom margin of the first monthly sheet or to a separate record which will be discussed next.

P - Prepare
A - Assist to prepare

Work Schedule
January Assignment

V - Verify & control
C - Proof check & read
R - Rule & repro. control

Sheet 1 of 5

Due Date	Work Class & Job (Non-recurring)	Hr.	J. J. Jones	A. B. Doe	R. C. Roe	Group A
	Work Class "A":	Total 54				
3	(a) Job 1	16	V 1	P 5	A 10	
4	(b) " 2	2			P 2	
7	(c) " 3	6	PV2		R 3	C 1
7	(d) " 4	20	P 2	A 10	A 8	
9	(e) " 5	10	V 1	P 6	R 1	C 2

EXHIBIT 5

Clerical Efficiency

A simple calculation to determine the "indicated" clerical efficiency can be made each month by posting the assignable and available hours to a summary record and calculating the efficiency percentage (see Exhibit 6.).

The available hours will probably have to be calculated separately. Such as:

Total hours paid for	
plus: Borrowed hours	less: Loaned out hours
less: Vacation hours	less: Non-allowable hours
less: Illness hours	Total deductible hours
less: Holiday hours	Net available hours

INDICATED CLERICAL EFFICIENCY

SUMMARY FOR YEAR____

Month	Assignable Hours: Non-Recurring	Recurring Monthly	Recurring Quarterly	Total	Available Hours	Efficiency %
January	500	300	100	900	1,200	75%
Etc.						

EXHIBIT 6

The difference between available hours and assignable hours, it is understood, also covers special jobs, i.e., those not on schedule, idle time, personal time, etc. Further refinement of clerical efficiency can be obtained by using work counts or other quantitative methods to determine work measurement units for the various routine tasks.

Clerical Job Costs

This step consists of costing the man-hours appearing on the record of hours worked by jobs. Costing can be done in any one of several ways:

1. Actual hourly rates for each individual.
2. Average hourly rate for all individuals in the unit.
3. Average hourly rate for a group in the unit.
4. Actual hourly rate plus a factor for fringe benefits—individual or by unit.
5. Average hourly rate plus a factor for fringe benefits—individual or by unit
6. Any other appropriate rate.

It should be sufficiently accurate to use average unit rates plus a factor for fringe benefits. This has the further advantage in that job costs can be discussed more freely since an individual's actual rate cannot be readily identified. Exhibit 7 is so costed. Overtime hours, which are circled when they are posted, should be costed at premium rates.

Summaries of man-hours and cost data can be made by jobs and work class on monthly and annual bases simply by adding like items on the various sheets.

A further costing refinement in respect to reports or statements can be obtained. You may want to add the cost for typing and duplicating reports, for example. In that case, using the figures in the left-hand column, let us suppose you have a 5-page quarterly report (such as Class A, Job 5 which appears on

P - Prepare
A - Assist to prepare

Work Schedule
January Assignment

V - Verify & control
C - Proof check & read
R - Rule & repro. control

Sheet of

Rpt. No.	pp. ea.	Due Date	Work Class & Job (Non-recurring)	Hr.	$	J. J. Jones	A. B. Doe	R. C. Roe	Group A
			Work Class "A": Total	54	162				
		3	(a) Job 1	16	48	V 1	P 5	A 10	
		4	(b) " 2	2	6			P 2	
2	2	7	(c) " 3	6	18	PV 2		R 3	C 1
		7	(d) " 4	20	60	P 2	A 10	A 8	
1	5	9	(e) " 5	10	30	V 1	P 6	R 1	C 2

EXHIBIT 7

Exhibit 7), 25 copies of which are required. Assume that it costs about $1.00 to type and proof each duplicating master for a page, plus $.01 for each duplicated page, plus $4.00 to collate and bind 25 copies. In our example this would cost (1.00 x 5) + (5 x 25 x .01) + 4.00 = $10.25 per quarter x 4 = $41.00, annually. Such costs do not need to be completely accurate; approximations used consistently for comparative purposes should suffice.

Supervisory costs could be allocated on some reasonable basis but experience will undoubtedly convince you that it is better to confine the costing to "direct" costs.

Multiple Uses

The procedures which have been set forth can be adopted in part or in total, depending on your needs or desires. The data developed by using this technique should prove to be of considerable assistance in the administration and control of clerical assignments. In addition to its use in controlling operations, it provides a means for advising the personnel under your supervision of work assigned to them. It also provides a means for advance planning, recording and measuring of actual performance, and determining the approximate time for and the cost of your clerical work assignments.

However, always bear in mind: information which is developed but not used, even though it may be developed as a by-product of another operation, is out-and-out waste. Therefore, when establishing your work inventory, go one step further—determine *who* uses *what* information. Does someone perform an action based on the work? Does your company receive some constructive benefit from the work? If not, question it with management. This may be a field where real savings can be made.

The Accelerated Depreciation Dilemma

by STEPHEN B. ACHTER

As ACCOUNTANTS, we know that the 1954 Internal Revenue Code permits the calculation of depreciation charges under any of the following methods:

1. The straight-line method.
2. The declining-balance method, using a rate not exceeding twice the straight-line rate.
3. The sum-of-the-years'-digits method.
4. Any other consistent method which, during the first two-thirds of the useful life of the asset, does not write off more than would have been written off in the same period of time under Method 2.

The code restricts the application of Methods 2, 3, and 4 to new assets with a useful life of three years or more, acquired after December 31, 1953. Exhibit 1 is a comparison of the results obtained under Methods 1 to 3 on an asset worth $1,000 with an estimated useful life of 10 years. For ease of calculation, we have assumed no salvage value.

The Problem Areas

An examination of Exhibit 1 indicates how the choice of depreciation methods used affects annual depreciation charges. An increase in the depreciation charge decreases profits and a decrease in depreciation increases them. Comparative income statements—the only difference between the two plants being the depreciation charge—are shown in Exhibit 2. Let us assume that this is a comparison in the early life of Plant 2 and that a major portion of the assets in both plants have an estimated, useful life of 10 years. If the double declining-balance method of depreciation is being used and no other changes are taking place, in the fifth year of operation the profits in Plant 2 will be better than Plant 1 and each year will become progressively better and better.

It is obvious that the choice of depreciation methods can distort the profit picture, and profits traditionally have been used as a guide in a number of areas to the formulation of rather important policy decisions. Some of these areas are as follows:

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1. Profit comparisons.
2. Product pricing.
3. Profit sharing plans.
4. Earnings per share of stock.
5. Dividend policy.

Accountants are continually being called upon for profit comparisons. For example, comparisons are made between periods of time, between plants and between divisions of a company. Comparisons are also made between companies and between a company and the industry of which it is a part. Unless one knows the depreciation methods used, these comparisons are meaningless.

Product costs are normally considered, among other things, in product pricing. Changing depreciation methods changes the apparent product cost. What is the proper depreciation method to be used in product costs for pricing? What depreciation methods are being used by competitors?

Comparison of Depreciation Methods
$1,000.00 Asset - No Salvage Value

	1 Straight line Amount	2 Double declining Balance Amount	Variance over (under) Col. 1	3 Sum of the years' digits Amount	Variance over (under) Col. 1
1st Year	$ 100	200	100	182	82
2nd Year	100	160	60	164	64
3rd Year	100	128	28	145	45
4th Year	100	102	2	127	27
5th Year	100	82	(18)	109	9
6th Year	100	66	(34)	91	(9)
7th Year	100	52	(48)	73	(27)
8th Year	100	42	(58)	55	(45)
9th Year	100	34	(66)	36	(64)
10th Year	100	27	(73)	18	(82)
Total deprec.	$1000	893		1000	
Balance (undepreciated)	-	107		-	

1. $1,000 ÷ 10years = $100/year. Annual rate 10%.

2. Maximum rate 20% (twice the straight-line rate): 1st year - 20% of $1,000, 2nd year 20% of (1,000-200) 800, etc.

3. Obtained in the following manner:
   a. Add the numbers representing the years of life of the asset. 1+2+3+4+5+6+7+8+9+10=55
   b. Use this sum as the denominator.
   c. Use the years of life in reverse order as the numerator, obtaining 10/55, 9/55, 8/55, etc.
   d. 1st year 10/55 of $1000 = $182
      2nd year 9/55 of $1000 = $164
      3rd year 8/55 of $1000 = $145
      Continue above for 10 years.

EXHIBIT 1

Many companies have profit sharing plans based on dollar profits. The manager whose profits are affected by the choice of depreciation methods may or may not have anything to say about the method used. Some divisions of a company may be adding to or replacing old equipment with new and have a choice of depreciation methods; others may be working with excess capacity created before a choice of depreciation methods was possible. How do we change depreciation methods without discriminating against someone?

Earnings per share of stock is information commonly used by a company and the investing public in a number of ways. The management of a company ordinarily likes to see this figure increase year after year, because it has a great effect upon what investors will pay for the company's stock on the market. When we change depreciation methods, we change earnings per share. Referring to Exhibit 2, for example, the earnings after taxes of Plant 2 are only one-half the earnings of Plant 1, yet the only difference is in depreciation. If this were a comparison of two companies with the same number of shares outstanding, there would be a tendency to value the stock of Plant 2 at one-half that of Plant 1. We know that this should not be the case.

As to the matter of dividend policy, it is fairly common for corporate management to limit dividends to a certain percent of earnings after taxes. Referring again to Exhibit 2 and assuming that the example represents two corporations instead of two plants, let us also assume that management has decided that 50 percent of earnings after taxes should be paid out as dividends. Plant 1 could pay out $250,000 which is 25 percent of cash returned, leaving $750,000 for reinvestment. Plant 2 could pay out $125,000 which is 10 percent of cash returned, leaving $1,125,000 for reinvestment. We have the anomalous situation of the corporation with the lesser amount of cash available paying out the greater dividends, and vice versa. In effect, the choice of depreciation methods has limited the amount of dividends which can be paid from Plant 2.

Accelerated Depreciation Serves a Purpose

It can be seen that the application of accelerated depreciation creates some real problems. Why, then, do we use it? The answer becomes fairly clear when we examine the cash-returned calculation of Exhibit 2. The faster we depreciate an asset in its early life, the faster we recover our cash invested. Even though later depreciation charges are smaller, the long-range conclusion is still the same, because a dollar returned today is worth more than a dollar returned some time in the future. This assumes, of course, no changes in income tax rates. A decrease in rates would maximize the cash-returned advantage; an increase in rates could nullify any benefit gained.

Comparative Income Statements
(000 dollars)

	Plant No. 1	Plant No. 2
Sales	5,000	5,000
Cost of Sales		
Depreciation	500	1,000
All other costs	3,500	3,500
Total	4,000	4,500
Profit before taxes	1,000	500
% of sales	20.0	10.0
Profit after taxes @50%	500	250
% of sales	10.0	5.0
plus: depreciation	500	1,000
Total cash returned	1,000	1,250
% of sales	20.0	25.0
Plant cost	10,000	10,000
Cash returned as % of plant cost	10.0	12.5

Note: We have assumed that Plant No. 1 and Plant No. 2 are identical in all respects. The only reason for the difference in depreciation is the depreciation method used—the straight-line method for Plant No. 1, the declining-balance method for Plant No. 2.

EXHIBIT 2

Three Ways Out of the Dilemma

If we agree that accelerated depreciation has some merit, then it becomes merely a matter of working out methods of handling the problems arising. Fortunately, there are a number of possibilities:

1. To separate excess depreciation from "normal" in the accounts—show only normal depreciation in regular operating statements but include excess depreciation in company statements for tax purposes.

2. To separate excess depreciation from "normal" in the accounts—show all depreciation in regular operating statements and the tax return and, when required, recalculate statements to exclude excess depreciation.
3. To show all depreciation in regular operating statements and the tax return but make further calculation of cash returned. This does not require a separation of excess versus "normal" depreciation, but the separation may be advisable.

Methods 1 and 2 require that normal depreciation be determined. Under Method 3, this is not required but may be helpful. Referring to Exhibit 1, if you normally depreciate on a straight-line basis, Column 1 shows the normal depreciation and the difference between Column 1 and Column 2 or 3 is the excess, which, however, becomes a credit figure in later years.

As to the choice of methods, Method 1 appears to be the best choice for most purposes. Reports that have to do with profit comparisons, pricing and profit sharing are the most frequently used and generally are more meaningful on a normal depreciation basis. Its use could save frequent recalculations to eliminate excess depreciation. Since the excess depreciation figure is readily available, however, the recalculation to include the excess in a statement can be made as required.

Method 2 would be the choice if management is primarily concerned with statements including all depreciation in the figures. Here again, since there is a separation of the depreciation amounts, a recalculation to exclude the excess can be made as required.

Method 3 would be the choice if management is primarily concerned with cash return, and there are a number of arguments in favor of such a choice. For example, referring to Exhibit 2, we could be misled by the profit calculations but the cash-returned calculations all point to the same conclusion, i.e., Plant 2 makes the more favorable showing. Even though we are required to prepare the usual statements and comparisons for other purposes, perhaps we should complete our calculations to the most fundamental basis of all—cash returned? As a matter of fact, most businesses make their long-range plans on a cash-returned less cash-disbursements basis (the cash forecast). Why, then, should we not keep the monthly, quarterly or yearly records on the same basis, so that we can tell whether we are proceeding according to plan?

Beyond these Covers

Books

Municipal and Governmental Accounting

Irving Tenner and Edward S. Lynn, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, Fourth Edition, 1960, 592 pp., $8.50.

Latest revision of a text first published in 1940, preparation of this edition was undertaken by Mr. Lynn, subsequent to Mr. Tenner's death. Stress is on integration of interfund accounting with the accounting for separate funds which is characteristic of institutional accounting, and upon "accounting as part of the total budget process." Cost accounting and cost finding for government units receive attention, as do fixed-asset and (where considered applicable) depreciation accounting.

Joint Financial Management Improvement Program

U. S. Bureau of the Budget (with the Treasury Department and the Office of Comptroller-General), Washington, D. C. Paper Bound, 1960, 186 pp.

Pretty generally covering Federal Government departments and agencies, this "annual report, fiscal year 1960" is arranged in two principal parts, one dealing with "developments of government-wide significance," the other consisting of individual department and agency (within departments and independent) reports, necessarily brief. An item of interest to accountants is a description (page 11) of "a series of presentations that would demonstrate agency experience in the application of cost-based financial management techniques."

Managers for Small Industry

Joseph E. Stepanek, Free Press, Glencoe, Illinois, 1960, 245 pp., $6.

It can hardly be that this somewhat general book, subtitled "An International Study," will not interest managerial and related personnel in American companies, dealing as it does with the qualities needed by managers of small enterprises in the developing "corners" of the globe. It is partly anecdotal in nature and also presents in appendices management training courses which have been applied abroad. Included is a 16-page picture section related to such courses.

History of Public Accounting in the United States

James Don Edwards, Bureau of Business and Economic Research, Michigan State University, East Lansing, Michigan, 1960, 368 pp., $6.50.

This chronology and exposition "add up to" a long look at the development, extent and status of the public portion of the accounting profession in this country. The "emergence" period is dated 1748 to 1895, and subsequent periods are identified with the dates: 1896 to 1913, 1913 to 1928 and 1928 to 1949. "Public Accounting in the United States during the 1950's" is treated in considerable detail in the final section of the book.

1961 U. S. Master Tax Guide

Commerce Clearing House, Inc., 4025 West Peterson Ave., Chicago 46, Illinois, Paper Bound, 1960, 448 pp., $3.

"For returns of 1960 income and 1961 tax planning," this manual-type publication is presented as reflecting all of the tax legislation of the last Congress. Item check-lists, e.g. of taxable and nontaxable items, precede the body of the text which is referenced to the Internal Revenue Code and U. S. Treasury Department Regulations.

Elementary Mathematics of Linear Programming and Game Theory

Edward G. Bennion, Bureau of Business and Economic Research, Michigan State University, East Lansing, Michigan, 1960, 140 pp., $5.

Attempt is made by the author of this book, a "Michigan Business Study," to draw the relatively unversed reader into its heavily mathematical topic. This topic, while not accounting proper, has become a tool of management through figures, and hence of interest to the accountant.

Data Processing Applications Handbook

Gille Associates, Inc., Book Tower, Detroit 26, Michigan, Loose-Leaf, "Combined" Edition, 1960, $55.

The eight applications, each with its own contents page and section, for which data processing applications are described in this manual, are: accounts payable, accounts receivable, billing, inventory control, order processing, payroll, production control and sales analysis. "Property accounting control" is considered within the inventory control section. Cases as well as more generalized procedures are offered in all sections.

Polya Type Distributions in Renewal Theory

Frank Proschan, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1960, 36 pp., $4.50.

Although the title is completed by the words, "with an application to an inventory problem," an area of concern to accountants generally, it should be acknowledged that mathematics of some difficulty are to be encountered on every page. Many will wish to "tackle" it, none the less, in awareness of the growing relevance of mathematical tools to accounting and management problems. This publication is a Ford Foundation Doctoral Dissertation Award Winner for 1959.

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